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FAMILIAR BUTTERFLIES AND

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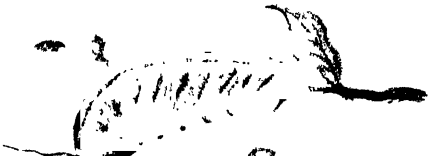

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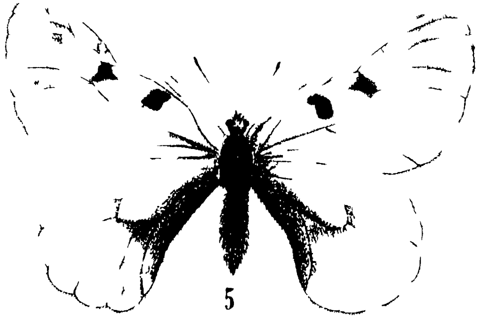

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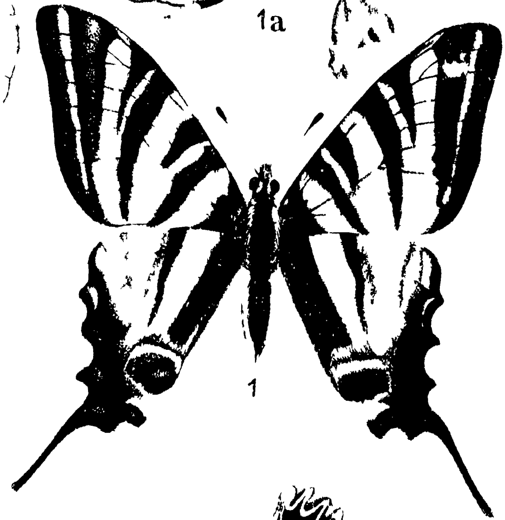

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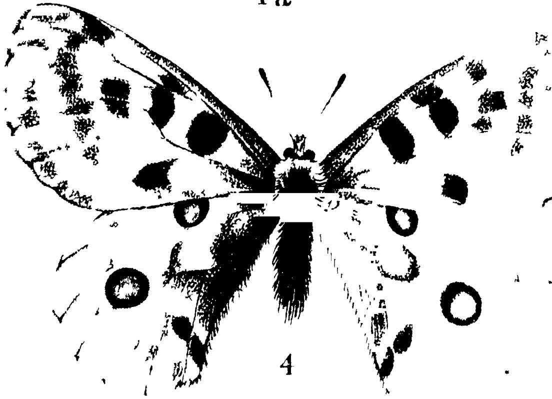

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FAMILIAR

BUTTERFLIES AND MOTHS

BY

W. F. KIRBY, F.L.S., F.E.S.

ASSISTANT IN ZOOLOGICAL DEPARTMENT, BRITISH MUSEUM (NATURAL HISTORY),
AND AUTHOR OF "EUROPEAN BUTTERFLIES AND MOTHS,"
"A HANDBOOK OF LEPIDOPTERA," ETC. ETC.

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1901

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KIR

PREFACE.

IN the present work I have endeavoured to give a popular account of some of the more interesting of our British Butterflies and Moths, and have added a small selection of European species as well. The time has passed when it was considered almost criminal to place a Continental specimen in a British cabinet (though, of course, Continental specimens should never be placed with British ones without being carefully labelled); and many persons visit the Continent now who may wish to know something of the insects which they do not recognise as common in Britain.

A few directions for collecting are added; but collecting should only be regarded as a means of procuring specimens for study, and not as an end in itself; and although we should always try to observe anything that seems to us specially interesting, it is a pity to destroy more specimens than necessary.

Owing to the elementary nature of the present work, English names are made prominent, and little is said of the technical characters of families and genera; but Latin names are added as well when a species is first mentioned, for they are in such general use that it would be a mistake to omit them. It has, however, been thought better to adhere to the arrangement and nomenclature employed in my "European Butterflies and Moths," which fact will explain any discrepancies in this respect between this book and others of my works.

The series of illustrations only includes figures of those groups of butterflies, and of moths which contain comparatively large species; the remaining groups are discussed, without illustrations, at the conclusion of the work.

Those who use the present little book as an introduction to European butterflies and moths, and who desire further to pursue the study, may find my larger work on "European Butterflies and Moths," of which a new and improved edition is in preparation, suited to their requirements.

W. F. KIRBY.

CHISWICK,
June, 1901.

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FAMILIAR BUTTERFLIES AND MOTHS.

INTRODUCTION.

One of the most extensive sections into which the Animal Kingdom is divided is the sub-kingdom of the *Annulosa*, or *Articulata*, which includes insects, crabs, spiders, centipedes, and other creatures of a similar kind. Instead of having a soft skin, and an internal framework of bones to which the muscles are attached, their bodies consist of a number of separate parts, more or less closely jointed together; and instead of possessing a bony framework inside, their bodies are covered with a tough integument, sometimes membranous, sometimes horny, or even bony, in its consistency. This is called the external skeleton; and it encases the soft internal parts of the body, protecting them from injury and serving as a strong point of attachment for the muscles. In fact, articulate animals are not only far less liable to injury than if they possessed a skeleton like vertebrate animals, but they are immeasurably stronger and more active than the latter, in proportion to their size.

Jointed animals are divided into several large sections, or classes, the largest of which, and the only one with which we are concerned at present, is that of the Insects.

Insects may be distinguished from other jointed animals by many important points of structure. Their bodies are divided into three principal portions: the head, thorax, and abdomen. The head is provided with a variety of organs, which are either connected with the senses, or are fitted for taking food. Insects have one pair of long, jointed organs called antennæ, or feelers, which differ much in structure in various insects, and are probably organs of touch, feeling, smelling, and, perhaps, also of hearing. The mouth-parts are very complicated in many insects, and are usually provided with one or two pairs of jointed organs called palpi, which are generally much shorter than the antennæ, and which are probably organs of touch and taste. On each side of the head of an insect is a large compound eye, composed of a great number of facets, like those of a multiplying glass; and in addition to these, many insects (not all) possess one, two, or three simple eyes, each consisting of a single round facet, placed on the crown or on the front of the head. They are not found in butterflies, but some species of moths possess two.

The thorax is the division of the body next to the head, and consists of three segments closely united, to each of which a pair of legs is attached, and to the second and third thoracic segments respectively are also attached the front and hind pairs of wings in winged insects. The abdomen, the hinder part of the body, contains the greater portion of the organs of respiration, nutrition, and reproduction. Insects do not breathe through their mouths, which they use only for biting, or for imbibing food, but through round openings called spiracles, or stigmata. These are more conspicuous in caterpillars than in butterflies and moths, and are placed on each side of the segments of the abdomen except the last. There is also a pair of spiracles on the first segment of the thorax.

Insects are not born in the form which they finally assume, but undergo a series of changes called metamorphoses, passing through the four stages of egg, larva (or caterpillar), pupa (or chrysalis), and imago (or perfect insect). In some insects, as in grasshoppers, the changes after leaving the egg are not well marked; the young insect resembles its parent, and undergoes merely a succession of moults, increases in size, and finally acquires wings. This is called an imperfect metamorphosis. But in other insects, such as butterflies and moths, the four stages are sharply defined, and have no resemblance to each other, as will presently be described. In such cases the insects are said to exhibit a perfect metamorphosis.

The class of insects is separated into seven principal sections, or orders,* one of the most interesting being the order of *Lepidoptera*, or Scale-winged Insects, which includes the Butterflies and Moths. They may be known from other insects by possessing four large membranous wings, which are clothed with scales. These scales are very pretty objects under the microscope, and rub off in a fine powder, if the insect is roughly handled. They are attached to the wing by a short stalk at the narrow end, and they are usually considered to be modified hairs. The wings are supported by a system of hollow branching tubes, called nervures (*see* the figure on p. 23, representing the Large Tortoiseshell butterfly, with the wings denuded of scales on one side). The body (and sometimes the adjacent portions of the wings) is also more or less clothed with hair or down, and around the outer edge of each wing runs a row of fine hairs, called the fringe of the wing. However, the fringes are not usually very long, except in some of the smaller moths, such as the clothes moths, in which they are often of great length.

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* Some of these seven orders are divided by various authors into smaller ones, but the Lepidoptera are always treated as a compact whole.

Butterflies and moths are almost exclusively vegetable feeders, though many butterflies (chiefly among foreign species, the Purple Emperor being the only British butterfly which strongly exhibits this habit) will perch on carrion; and the larvæ of some of the smaller moths feed on dried animal products. The full-grown insect is provided with a proboscis, which is a long hollow tube, composed of two separable parts, which allow of the proboscis being cleaned by the insect if it should happen to get clogged. In some moths the proboscis is more or less obsolete, but in others it is of great length, and moths are sometimes caught and held fast by the proboscis while probing tubular flowers for nectar. Unless it is comparatively short, it is generally rolled spirally, when not in use.

Eggs are laid by the parent insect on the plant which is the proper food of the larva. Some species deposit their eggs singly, but others lay them in a cluster, which is occasionally covered with down from the body of the parent moth. When hatched, the young larva usually begins life by devouring its empty egg-shell. It has been suggested that this odd habit is a provision of Nature to prevent enemies of the larvæ being attracted to the spot by the sight of the empty egg-shells.

After devouring the egg-shell, the larva sets to work to feed voraciously on the leaves of the plant on which it finds itself. The eggs of butterflies and moths are usually round or oval, and generally of a green or yellowish colour; they are often beautifully ribbed and fluted. A larva has no resemblance to the perfect insect into which it will develop; it is a fleshy, worm-like creature with a hard head, strong jaws, very inconspicuous antennæ, and a few simple eye-specks on the sides of the head. The first three segments behind the head each bear a pair of short, horny legs, corresponding to those of the perfect insect, and there are usually four pairs of membranous legs, or pro-legs as they are called, attached to the four abdominal segments before the last; while the terminal segment of the abdomen bears a fifth pair, slightly differing in structure, called claspers. Thus, a normal caterpillar of a butterfly or moth has sixteen legs, but in the large group of slender-bodied moths known as Geometridæ, or Loopers, we seldom find more than ten legs, the first three pairs of pro-legs being more or less obsolete. There are other modifications in the legs of both perfect insects and larvæ, some of which will be referred to later in the book.

Most larvæ moult several times in the course of their lives, for they eat so voraciously and grow so rapidly that their skin soon becomes too tight for them, and has to be cast off. At the last moult, however, it is not a larva with a new skin which comes from the cast skin of the old one, but a case called a pupa, or chrysalis, from which, in due time, the perfect butterfly or moth will emerge. The pupa is destitute of organs of sense, nutrition, or locomotion, and is sometimes fixed to a twig by a belt round the body, or is suspended by the tail; while it is frequently enclosed in a case called a cocoon, often formed of pure silk, or is concealed in an earthen cell in the ground. From the pupa emerges the perfect insect.

Larvæ are frequently very destructive to the plants on which they feed, and would be much more so did they not fall an easy prey to a great variety of insect-eating animals, not the least important of which are other insects. Not only do sand-wasps provision their nests with larvæ which they paralyse with their sting to keep them alive and fresh till their own grubs are hatched and ready to devour them; but a great number of four-winged and two-winged flies deposit eggs on or in their bodies, and the grubs which these eggs produce feed in the body of the unfortunate caterpillar till it is full-grown, or becomes a pupa, when it dies, and the parasites emerge from its body, either as grubs, in which case they often form their own cocoons round the dead insect, or as perfect insects, ready to seek for other larvæ, and to continue their work of destruction.

Among the larger insect-eating animals the most important are birds, which destroy an immense number of larvæ and perfect insects especially during the nesting season, when they have to feed their young broods. For this reason it is very necessary that small birds should be protected, as they are in England at present, for the destruction of insects means so much less damage to the crops. It is chiefly small green or brown caterpillars which are preyed upon in this way by the smaller birds; but the hairy caterpillars which they dislike are relished by other birds, such as the cuckoo. Still, it is necessary to use discretion when we attempt to readjust the balance of Nature by our own efforts, or we may disturb it for the worse. Some years ago our common sparrow was introduced into America to destroy injurious insects, and it did clear off one pest in some places, a smooth Looper caterpillar. But its place was taken by a much more troublesome hairy caterpillar which the sparrows would not touch, and the birds have made themselves a great nuisance, with which the Americans would gladly dispense.

A whole order of small animals is called Insectivora, because the shrews, hedgehogs, and other creatures included in it chiefly eat insects; mice, lizards, etc., will also destroy insects; dragonflies catch and devour butterflies by day, and bats destroy a great number of moths by night. Insects have so many enemies that it is only because they are so prolific that they are saved from actual extermination.

Part I.

BUTTERFLIES.

Butterflies are usually associated with summer sunshine, and rightly so, for they are most numerous in warm countries, where the luxuriant vegetation offers their larvæ the greatest variety of food. They are not very numerous in Europe, where there are about 300 species, in round numbers; and in England there are only between sixty and seventy different kinds to be found, many of which are very seldom met with. In Scotland and Ireland the butterfly fauna is still poorer, only about two-thirds of the English species being found in either of the two countries mentioned. Butterflies are more numerous in the Eastern counties of Great Britain than in the Western, but in Ireland they are probably more numerous about Killarney than in any other part of the island. On the Continent the richest countries are those abutting on the Alps and Pyrenees, where there is a great variety of vegetation owing to the variations in elevation and temperature, and, consequently, a much greater variety of butterfly-life too. These countries produce about 200 species. The other hundred species are peculiar to Northern, Eastern, or Southern Europe, and do not reach the mountain ranges of Central Europe.

It is easy to distinguish a butterfly from a moth. All butterflies, at least in Europe, fly only in the daytime; and even when a passing cloud obscures the sun, most butterflies will settle down, and do not rise again till the sun reappears. Nor do they fly very much in the early hours of the morning, before the dew is well off the grass; nor late in the afternoon, when the heat of the day is over. The majority of moths, on the other hand, fly only at dusk, or at night, though there are many species which are just as active in the daytime as butterflies.

Butterflies and moths, like other insects, possess two long jointed organs called antennæ. The Latin word *antenna* means a sail-yard, and is used in entomology for the feelers of insects. In butterflies these organs are straight, slender, and terminate in a more or less thickened club or knob at the extremity. In moths the antennæ differ considerably in shape, but whether they are simple, or serrated, or feathered, they usually taper to a point, or else the greatest thickness is in the middle, or at least before the extremity, which never forms a distinct knob as in the butterflies. The difference in the antennæ will prevent even the Looper moths, most of which are brightly coloured and have broad wings and slender bodies, from being mistaken for butterflies.

Although butterflies are sun-loving insects, many species are found only at a great elevation in the mountains, up to and even beyond the limit of the eternal snow; and several species are met with very far north, not only in Lapland, but far up towards the North Pole in Greenland. In Northern Europe and Asia, too, many species frequent the plains which further south are only to be found in the mountains.

As a rule, islands are very poor in butterfly life, and the further they are separated from the nearest continent the fewer butterflies they produce. The butterfly fauna of the British Islands is very poor compared to that of France or Germany; but such islands as the Canaries, Madeira, Malta and New Zealand have scarcely a dozen species each to show, while the butterflies of such outlying islands as St. Helena and the Galapagos are still fewer, and there is no indigenous butterfly found in Iceland at all.

Owing to extensive drainage and cultivation, the clearing of forests and the destruction of weeds, butterflies are much less numerous in England now than was the case even half a century ago, and one or two species, formerly common, are either extinct or on the verge of extinction in Britain. On the other hand, some species which feed on cultivated plants (the Clouded Yellow butterflies, for example, the larvæ of which feed on various species of clover) are more numerous and more widely distributed in the British Islands than in former years. But although a butterfly cannot exist in the absence of its food-plant, it by no means follows that it will be equally abundant wherever its food-plant is met with. There are some which feed on the commonest plants, such as the Black-veined White Butterfly (which feeds on hawthorn and fruit trees), which are of great rarity, or even, as in the case of the butterfly mentioned, appear to be approaching extinction in England, though they were formerly widely distributed and not uncommon. In some cases this may be due to the Wild Birds Protection Act, and the consequent increase in the numbers of our insectivorous birds. However, although the disappearance of insects may be regretted from an entomological point of view, we must not let this blind us to the inestimable service rendered to agriculture by birds in keeping down the numbers of injurious insects which would otherwise eat up all vegetation, like a swarm of locusts.

Since the time of Linnæus, who invented the system in the middle of the eighteenth century, every animal and plant has been known by two names, called its genus and species. It is the same system by which every man or woman is known by a Christian and surname, the Christian name corresponding to the specific name, and the surname corresponding to the generic name, only that naturalists place the generic name, or surname, first, and the Christian name, or the specific name, last. These names are either Latin, or are cast in a Latinised form, though there is an imperfectly followed rule that generic names should be derived from the Greek. The last rule was not always respected even by Linnæus himself. This system, however, is far better than if insects were only called by their English or French names; for all over the world an entomologist knows that *Papilio Machaon* means our Swallowtail butterfly, but the English name would be as unintelligible to a French or German entomologist as any other English word. The name of the describer of a genus or species is generally added to the name of the insect, to authenticate it.

Butterflies are divided into various sections called families and subfamilies, which are connected with each other by different characters of more or less importance. In classifying European butterflies, it is most usual to begin with the Swallowtails and Whites, followed by the Fritillaries, Tortoiseshells, Meadow Butterflies, etc., and after these, the Blues and Skippers; and this is the system we shall adopt in the present little book. Some authors, however, adopt a different arrangement, placing the Blue butterflies next to the White and Yellow ones; while in books dealing with the butterflies of the world, many authors now remove the Whites and Swallowtails nearly to the end of the series, placing them between the Blues and the Skippers. It must not be supposed that one system is necessarily more correct than another; it is merely an attempt to form a linear arrangement by laying more stress on certain characteristics than on others; and the importance to be attached to different characters, such as the legs, the veining of the wings, the structure of the larva, etc., is largely a matter of individual opinion; and by placing insects in a linear series we are liable to forget that there are numerous characters by which they are related to other species from which we thus artificially separate them. Nevertheless, a linear system, notwithstanding its obvious disadvantages, is by the nature of the case the only one which it is possible to adopt either in a book or in a collection.

THE SWALLOWTAIL BUTTERFLIES AND THEIR ALLIES.

The Swallowtail butterflies derive their name from the long appendages to the hind wings, which are so conspicuous in the two species figured on our first plate, and in many, though not all, of the allied species. These butterflies were placed first by Linnæus in his genus *Papilio*, a name under which he originally included all the butterflies, and since his time the name *Papilio* has usually been retained for the Swallowtails and their allies. They have six perfect legs in both sexes: the inner margin of the hind wings is concave; the larvæ have always a strongly smelling, retractile fork behind the head, and the pupa is attached by the tail, and also by a belt of silk round the middle of the body. *Papilio* includes hundreds of the largest and most beautiful butterflies in the world, but is only represented in Europe by four species, which, though they look conspicuous enough in a collection of European butterflies, are far surpassed in size and beauty by the Swallowtails of warmer countries.

Linnæus named the Swallowtailed Butterflies which he described after the heroes of the Trojan War; and the commonest European species he called *Papilio Machaon* (Plate I., Fig. 2). It is curious that though it is a very common insect on the Continent in gardens and clover fields, and the caterpillar feeds on a variety of umbelliferous plants (including the common cultivated carrot), it has never been common in England, during the last century at least, except in the Fen districts; and since these have been drained, it is scarcely to be met with in England now, except at Wicken Fen, in Cambridgeshire, and in some parts of Norfolk. However, during 1900 several specimens were taken in different parts of England, where it had not been seen during recent years, suggesting the possibility that it may some day become more abundant with us, and spread itself more or less over the country, as it does on the Continent, and abandon its predilection for the Fens. The larva and pupa are figured at Plate I., Fig. 2*a*; the retractile fork on the neck of the former (not shown in the figure) is believed to be used to drive away parasitic flies or other enemies.

Most Swallowtail butterflies have a very powerful flight, and are not easily captured, except at rest. The tails are very brittle, and will often be found to be damaged or broken off, even in specimens which are otherwise perfect when captured.

The Corsican Swallowtail (*Papilio Hospiton*, Géné) is very like the Common Swallowtail, but is darker, and the tails of the hind wings are very short. It is only found in the islands of Corsica and Sardinia; but, like several other butterflies which are restricted to these two islands, differs so much from the nearest allied species which is found on the mainland of Europe, that it has received a separate name, and is considered to be a distinct species. This is not the only point of interest about this butterfly. It exhibits the tendency of some Swallowtail butterflies to lose the tail. There are several other Swallowtails in India and North America where local forms are found in which the tail is more or less obsolete.

Our Common Swallowtail is a wide-ranging butterfly, and local forms or closely allied species are met with throughout Europe, North Africa, Northern and Western Asia, as far as North India, and even along the west coast of North America from Alaska to California. The largest and finest of these Swallowtails, however, is found in Japan, the Japanese Swallowtail (*Papilio Hippocrates*, Felder) measuring as much as five inches across the wings. Latterly the Japanese have paid much attention to entomology, and it may interest some of our readers to hear that an illustrated entomological magazine in Japanese is now actually issued in Japan.

The Scarce Swallowtail (Plate I., Fig. 1, and Fig. 1*a*) is thus called because it was considered to be a British species by the older writers on entomology, but no specimen has been even reputed to have been met with in England on any reliable authority for so many years that there is little doubt that if it ever inhabited this country at all it has long been extinct. On the Continent it is not so common as the last species, becoming scarce, or disappearing, in the northern parts of Central Europe. The larva feeds on a variety of fruit and forest trees, and the butterfly prefers wooded slopes. Linnæus called it *Papilio Podalirius.*

The Festooned Butterfly (*Thais Hypermnestra* of Scopoli, Plate I., Fig. 3) is found in South France, Italy, the extreme south-east of Germany, and away through Austro-Hungary, and eastwards to the

PLATE II.—BUTTERFLIES.

FIG. PAGE

1.—Large White (*Pieris Brassicæ*) 18

1*a*.—Ditto (Larva)

2.—Orange Tip (Male) (*Euchloe Cardamines*) 19

2*a*.—Ditto (Female)

3.—Clouded Yellow (*Colias Edusa*) 19

4.—Brimstone (*Gonepteryx Rhamni*) 20

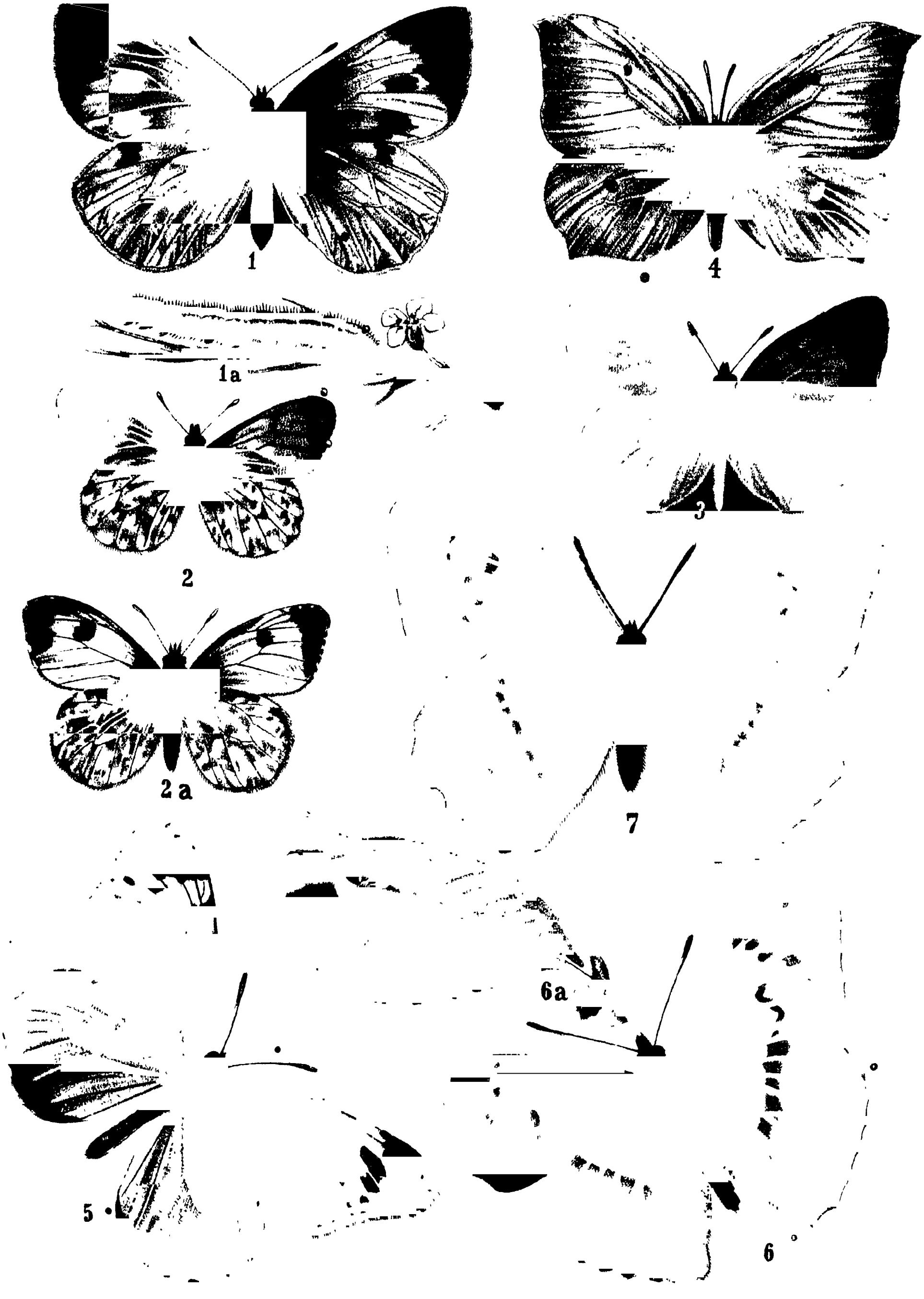
5.—Chrysippus (*Danaus Chrysippus*) 30

6.—Purple Emperor (*Apatura Iris*) 29

6*a*.—Ditto (Larva)

7.—Poplar Butterfly (*Limenitis Populi*) 29

Plate I.



Volga. The genus *Thais* includes only a few species, which are almost confined to the neighbourhood of the shores of the Mediterranean and Black Sea.

The Apollo Butterfly (*Parnassius Apollo*, Linnæus) is the largest and handsomest of all the peculiarly mountain butterflies of Europe. We have figured it at Plate I., Fig. 4, and its larva at Fig. 4*a*. The latter feeds on orpine (*Sedum Telephium*) and similar plants. The butterfly is common in mountainous districts in many parts of Europe and Northern Asia, and has been reputed British, but no doubt erroneously, for it is impossible that so conspicuous an insect could have escaped notice if it was really to be found within the limits of our islands. In Siberia it attains to a much larger size than in Europe. It flies at a low elevation in the Swiss mountains in company with the Black-veined White butterfly (*Aporia Cratægi*, Linnæus). A smaller and rarer, but very similar, species (*Parnassius Delius*, Fabricius) is found at a considerable elevation in Switzerland.

A third Alpine species of this genus, the Muse (*Parnassius Mnemosyne*, Linnæus), differs from *Apollo* in wanting the red spots on the hind wings (Plate I., Fig. 5). It is widely distributed in Europe, though it is very local; and it is remarkable that while it is a mountain butterfly in most districts (and it is often very abundant where it is found at all) it is also met with on level ground on the steppes of Russia, and in some of its localities in Northern Europe.

THE WHITE AND YELLOW BUTTERFLIES.

The butterflies belonging to this section are of more importance than any others to farmers and gardeners, for they include several of the most injurious species, such as the three species of white butterflies which are so destructive to cabbages, Indian Cress (the handsome garden flower improperly called Nasturtium), and similar plants. They may be distinguished from the Swallowtails by the inner margin of the hind wings not being concave, and by the absence of a retractile fork on the neck of the caterpillars. Two of the three common white butterflies, the Large White (*Pieris Brassicæ*, Linnæus), and the Small White (*P. Rapæ*, Linnæus), are to be met with in almost every garden and meadow throughout the country. The Large White is figured on Plate II., Fig. 1, and the larva at Fig. 1*a*. A female is figured; the male has no black spots on the fore wings above. The Small White butterfly is very similar to this, but is usually considerably smaller, and the dark tip of the fore wing is paler, being ashy rather than blackish. The Small White butterfly is probably still commoner in England than the Large White, and is now very largely distributed throughout the kitchen gardens of the world. This butterfly has been introduced into the United States, where it is now one of the commonest of the spring butterflies, and is just as destructive as in Europe. The third common species, the Green-veined White (*Pieris Napi*, Linnæus), is about the size of the Small White, from which it may be distinguished by the broad greenish veins on the under side of the hind wings. It is more of a woodland insect than the other species, though it also frequents fields and gardens. There is a mountain form of the female of this insect in which the wings are more or less of a brownish-grey colour above. The Orange Tip (*Euchloe Cardamines*, Linnæus), of which the male is represented at Plate II., Fig. 2, and the female at Fig. 2*a*, is a very pretty spring butterfly, very common in many places. The female seems to be scarcer than the male, but this may easily be due to the fact that it is often mistaken, on the wing, for one of the smaller white butterflies. It is the only species of Orange Tip found in Northern and Central Europe, but there are several others in Southern Europe, some of which have yellow instead of white wings. The pupa is a peculiar boat-shaped object. The female has sometimes been mistaken for one of the rarest of our English butterflies, the Bath White (*Pieris Daplidice*, Linnæus), which is nearer related to the Common Whites than to the Orange Tips; but in the Bath White the fore wings have a broader dark border, and the under surface of the hind wings is of a much duller green, varied with white. On the Continent the Bath White is not uncommon, and is found in meadows and open weedy places.

The Clouded Yellow butterflies, the commonest species of which (*Colias Edusa*, Fabricius) is figured on Plate II., Fig. 3, is a very brightly coloured insect, which is generally found in clover fields in the autumn, and though its flight is low, it is so swift that it is not easy to run it down. The female differs from the male in having the dark border spotted with pale yellow. The Pale Clouded Yellow (*Colias Hyale*, Linnæus) is a less common species, of a paler yellow, with blackish borders to the fore wings, spotted in both sexes, and incomplete towards the hinder angle of the wing. There is a pale variety of the female of the Clouded Yellow (var. *Helice*, Hübner) which cannot be mistaken for the other species, because the dark border of the fore wings is continued broadly to the hinder angle.

On the Continent several other species of Clouded Yellows are found, some of which are mountain species. The under surface of the hind wings of our Clouded Yellow is green, but several of the Alpine and Polar species are of a greenish colour on the upper surface of the wings, instead of yellow.

The Brimstone butterfly (*Gonepteryx Rhamni*, Linnæus; figured at Plate II., Fig. 4) is one of our earliest spring butterflies, often appearing in mild winters as early as February. The female is of a whitish colour. It is very common in woods in the south of England, where the caterpillar feeds on buckthorn, but it is rare in the north of England and the south of Ireland, and is not found in Scotland.

The largest and smallest British butterflies of this section still remain to be noticed. The largest is the Black-veined White (*Aporia Cratægi*, Linnæus), a white butterfly with unspotted wings, which are slightly transparent in the female. It is found in June, and only remains a short time on the wing. The larva feeds on hawthorn, fruit trees, etc., and is considered an injurious insect on the Continent. In former years it was common in many parts of England, but it has latterly become very scarce. It is, however, a butterfly which is always commoner in some years than in others, as is also the case with the Clouded Yellows, and it is by no means impossible that some day or other it may again be common in England. There have been years in which even such common butterflies as the Large White and the Small Copper have been positively rare, but they have soon succeeded in recovering their lost ground.

The Wood White (*Leucophasia Sinapis*, Linnæus) is rather smaller than an Orange Tip, and has rather long and narrow wings, only marked with an ashy spot at the tip of the fore wings. The body is long and slender. It is a very local insect, and flies slowly in woods. Its green larva feeds on vetch and trefoil. Some recent authors consider it to be allied to a sub-family of transparent-winged butterflies found in South America.

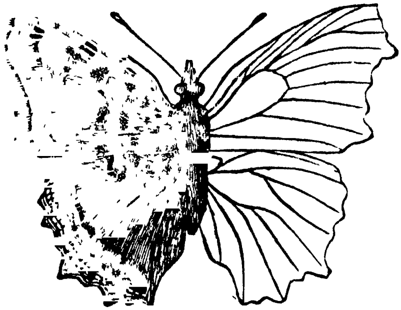
THE NYMPHS, DANAIDS AND SATYRS.

Under these headings we may group together most of the remaining larger butterflies of Europe, which are easily distinguished from the Swallowtails, Whites and Yellows, as well as from the smaller butterflies, by having only four pairs of legs fitted for walking, the first pair being more or less rudimentary in both sexes. The pupæ are suspended by the tail, without any other support; except those of some of the Satyrs, which are found among leaves on the surface of the ground. These butterflies form a very extensive series, and may be divided into several more or less distinct sections.

We will first notice the section of Angle-Winged butterflies, which contains several of the commonest and handsomest of our species. The spiny caterpillars mostly feed on nettle, and the chrysalids are often more or less metallic. (This is the origin of the word chrysalis, which is only properly applicable to metallic-coloured pupæ.) The first of this group which we have to notice is not a British species, but it is not uncommon in many places on the Continent, though somewhat local in its occurrence. It is the Map Butterfly (*Vanessa Levana*, Linnæus), and is the smallest of the group to which it belongs. It is very remarkable for appearing in two different forms at different seasons of the year, as may be seen in our figures on Plate III., where Fig. 7 represents the form always assumed by the spring brood of the insect, and Fig. 8 represents the summer form (*Vanessa Prorsa*, Linnæus). The only specimen which I have seen alive I caught flying over brambles in the Black Forest.

Next to these we may mention the Comma butterfly (*Vanessa C-album*, Linnæus), represented at Plate IV., Fig. 1, and its larva and pupa at Fig. 1*a*. It is remarkable for its strongly dentated wings and for the white C on the under surface of the hind wings, from which it derives its name. The Comma butterfly is not so common in England as formerly, and is usually met with flying about bushes. Its larva feeds on a variety of trees and plants.

The Small Tortoiseshell Butterfly (*Vanessa Urticæ,* Linnæus; Plate III., Fig. 2) is a very common and widely distributed butterfly, which is plentiful wherever nettles are found. Like several of its allies, it hibernates, and reappears in the spring, sometimes very early in the season. There are several species on the Continent which resemble this, but the only one found in England is the Large Tortoiseshell, or Elm butterfly (*Vanessa Polychloros,* Linnæus), which is larger and paler, and has a marginal row of blue spots on the hind wings only. It is less common than the Small Tortoiseshell, and is less widely distributed. The larva feeds on various trees, especially elm. The Large Tortoiseshell is figured in the accompanying cut. One side of the wings is denuded of scales to show the nervures.



TORTOISESHELL BUTTERFLY, SHOWING THE NERVURES IN THE WING.

The Camberwell Beauty (*Vanessa Antiopa,* Linnæus; Plate III., Fig. 3) is the rarest British butterfly of this section, and is also very uncertain in appearance. Our figure represents a Continental specimen; in British specimens the border is usually white instead of yellow. The larva (Fig. 3*a*) feeds on willow, and sometimes on other trees.

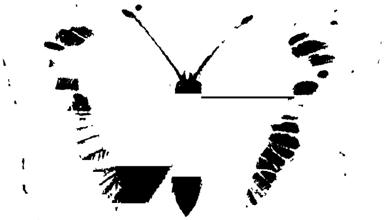
The Peacock butterfly (*Vanessa Io*, Linnæus; Plate III., Fig. 4) is not nearly so common as the Small Tortoiseshell, though its black larva (Fig. 4*a*) also feeds on nettle. It is, however, no rarity in the south of England, though it is scarce in Scotland, as it is likewise at the southern extremity of its range in Europe.

The Red Admiral (*Vanessa Atalanta*, Linnæus; Plate III., Fig. 5) is one of the commonest and most beautiful of our British butterflies, frequenting gardens and hedgerows in the outskirts of London, as well as in the country. Its larva feeds on nettle; and the butterfly, like the Camberwell Beauty, is very fond of settling on fallen fruit. It is more frequently seen towards the end of summer and in the autumn than earlier in the year.

The next butterfly on our list, and the last of the Angle-wings, is the Painted Lady (*Vanessa Cardui*, Linnæus; Plate III., Fig. 6). The colours of freshly emerged specimens are very delicate. It is somewhat uncertain in appearance, and is a gregarious insect, sometimes migrating from one district to another in vast flocks. In England it is most frequently met with on weedy slopes or rough fields, where its larva feeds on a variety of low plants, especially on thistles and nettles. It may truly be called a cosmopolitan butterfly, for it extends westwards from Ireland to Japan, and over the American Continent

PLATE III.—BUTTERFLIES.

FIG. PAGE
1.—White Admiral (*Limenitis Sibylla*) (Upper and Under Surface) 28
2.—Small Tortoiseshell (*Vanessa Urticæ*) 23
3.—Camberwell Beauty (*Vanessa Antiopa*) 23
3*a*.—Ditto (Larva)
4.—Peacock Butterfly (*Vanessa Io*) 24
4*a*.—Ditto (Larva)
5.—Red Admiral (*Vanessa Atalanta*) 24
6.—Painted Lady (*Vanessa Cardui*) 24
7.—Map Butterfly (*Vanessa Levana*) 22
8.—Map Butterfly (Dark Form) (*Vanessa Prorsa*) 22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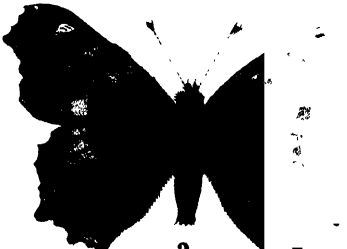
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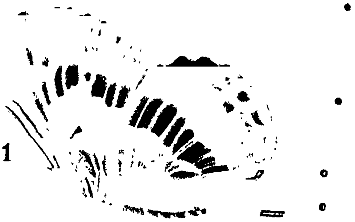
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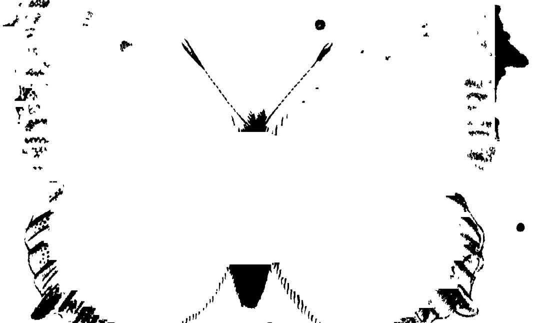
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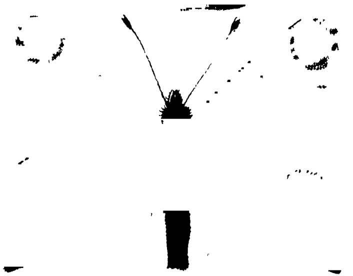
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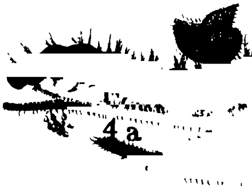
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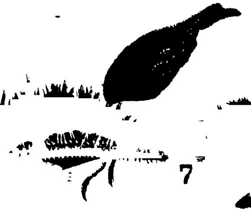
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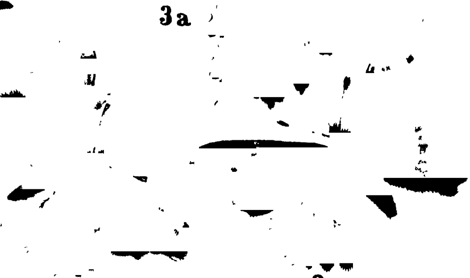
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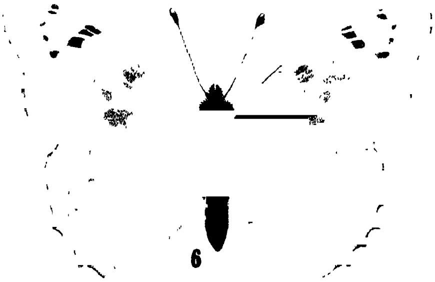
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from north to south and east to west, though it seems to be absent from the forest region of tropical America; while it extends southwards from Europe and Asia to the Cape of Good Hope, Australia, and New Zealand. There is no other butterfly which has anything like such a universal range throughout almost the whole world.

The next butterflies which we have to discuss are the Fritillaries, which may be divided into the Chequered Fritillaries, the Small Silver-spotted Fritillaries, and the Large Silver-marked Fritillaries. Their larvæ are more or less spiny, and feed on low plants. Many of the silver-marked species feed on violets.

The Chequered Fritillaries are destitute of silvery markings on the underside of the wings. Three species, all very local in England, are found with us. They frequent waste places in spring, and their larvæ feed on plantain and other low plants. The first species, the Greasy Fritillary (*Melitæa Aurinia*, Rottemburg), figured on Plate IV., Fig. 3, may easily be distinguished by the alternation of paler and darker spots on the upper surface, and by the peculiar glazy appearance of the under surface, from which it derives its name. It is rather variable, and is found in some parts of Ireland as well as in England. The other two species are very similar in size and general appearance, but they want the distinctive peculiarities of the Greasy Fritillary. One of them, the Glanville Fritillary (*Melitæa Cinxia*, Linnæus; Plate IV., Fig. 2), may be known by the round black spots towards the base of the hind wings beneath; it is the rarest and most local of the three, and is believed to be now extinct everywhere in England except in the Isle of Wight, though it was formerly found near London and elsewhere.

The third species, the Pearl-bordered Likeness Fritillary (*Melitœa Athalia*, Esper) is tessellated with black and tawny above, and with yellow and tawny below, broken up by black lines.

Numerous other species, allied to each of those mentioned, are found on the Continent. One or two species, belonging to the section represented by the Greasy Fritillary, are blackish, with extensive white and red markings; these are found in Switzerland and Lapland.

The smaller Silver-spotted Fritillaries are numerous on the Continent, and several species are found exclusively in the mountains, or in the Polar regions; but they are only represented in England by two species, known as the Pearl-bordered Fritillary (*Argynnis Euphrosyne*, Linnæus) and the Small Pearl-bordered Fritillary (*Argynnis Selene*, W. V.). The upper side of the latter is represented on Plate IV., Fig. 4. The species are really very similar to each other, and are common in May. They have a row of silver spots round the margins of the hind wings beneath; but the Pearl-bordered Fritillary, which usually appears a few days before the other species, differs from it in the under surface of the hind wings being redder, with only one large central silvery spot, in addition to the row of marginal spots, whereas the Small Pearl-bordered Fritillary has several.

The two Pearl-bordered Fritillaries are as abundant on the Continent as in England, especially the smaller one. But although the Continental winters are longer and colder than ours, these butterflies, which are almost always single-brooded with us, are double-brooded on the Continent, reappearing in August just as abundantly as in May. There seems to be something specially unfavourable to butterflies in the climate of our islands, for butterflies are far more numerous on the Continent, in individuals as well as in species, than with us; and the same tendency is seen increasingly in Ireland, which may be called an island within an island, and where, as a rule, even the commonest butterflies are much less plentiful than in England. Some species of moths, however, are very abundant in Ireland in certain localities.

The largest Fritillary found in England, and an extremely handsome butterfly, is the Silver-washed Fritillary (*Argynnis Paphia*, Linnæus), which is represented on Plate IV., Fig. 7, and its larva, which feeds on violets, at Fig. 7*a*. The male is represented; the female is less brightly coloured, and the dark stripes on the fore wings are absent, leaving only the spots. A rare variety of the female, sometimes found in the New Forest, is of a dark greenish brown. This butterfly is common in woods in many parts of England.

The Dark-green Fritillary (*Argynnis Aglaia*, Linnæus; Plate IV., Fig. 6), so called on account of the green, silver-spotted under surface of the hind wings, is likewise a common insect on heaths, clover fields, etc. There is a very similar species, which is more confined to woods, called the High Brown Fritillary (*Argynnis*

Adippe, Linnæus). This may be distinguished from the last by the spots on the under surface being less brightly silvery, and by possessing a row of small red spots with silvery centres towards the margins of the hind wings beneath.

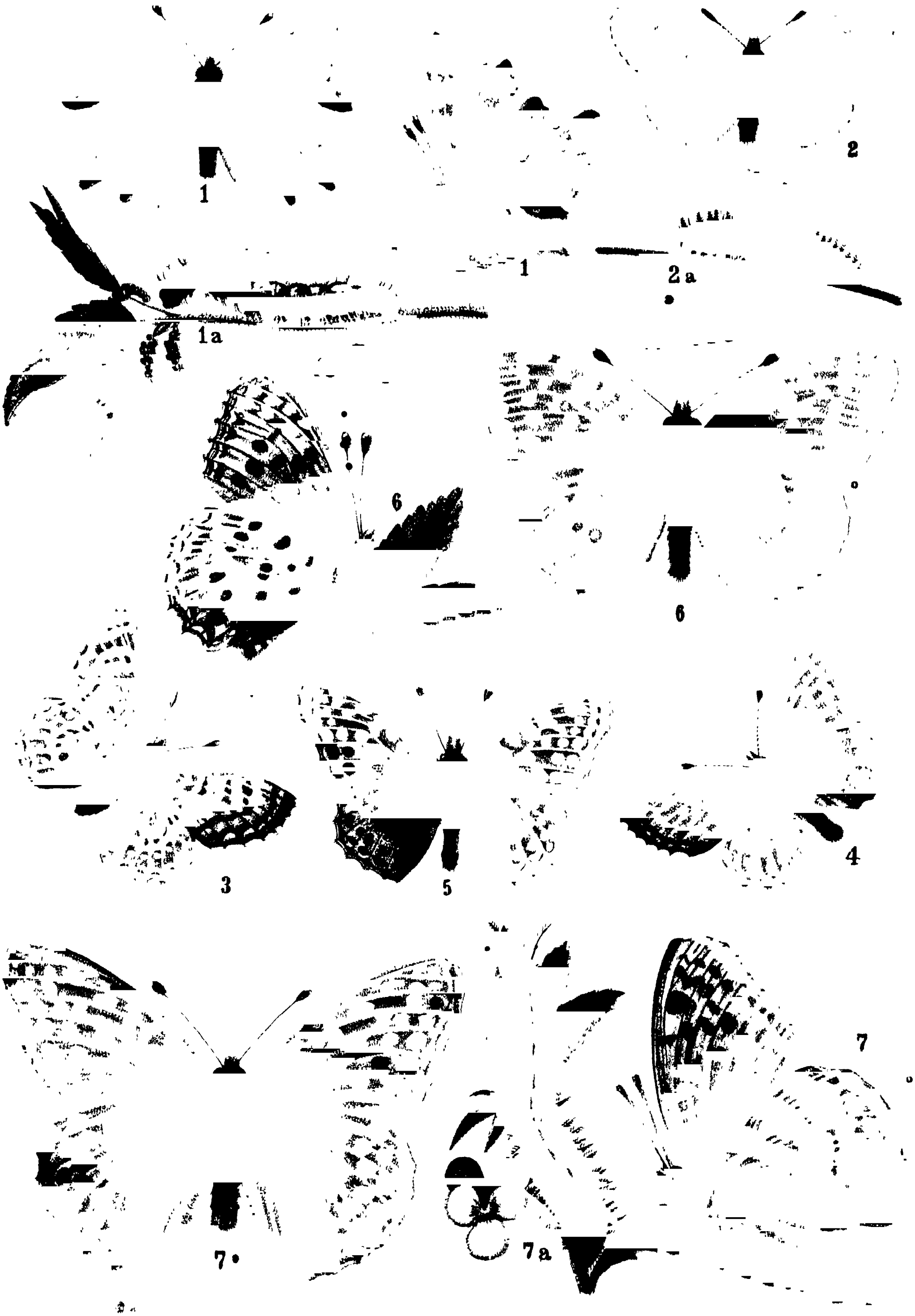
The Queen of Spain Fritillary (*Argynnis Lathonia,* Linnæus), figured on Plate IV., Fig. 5, is easily recognisable by its size and shape, and by the large size of the bright silver spots on the under surface of the wings. It is not uncommon on the Continent, but is always a great rarity in the south of England.

A hundred years ago the White Admiral (*Limenitis Sibylla,* Linnæus) was one of the commonest butterflies around London and in the south of England; but it is now only to be met with in isolated localities many miles apart. It is entirely a woodland insect, and it appears in June and July, frequenting the glades and outskirts of extensive woods, where its larva, which has a bifid head and short spines, in addition to several long branching ones, feeds on honeysuckle. The butterfly is a gregarious insect, and has a strong sustained sailing flight, but very different from that of the Purple Emperor, with which it has somewhat inaptly been compared. It is figured at Plate III., Fig. 1. There is a closely allied butterfly found on the Continent which we may call the Dark Admiral (*Limenitis Camilla,* W. V.). It is very similar to the British species, but is blacker, with a slight purple flush, and with smaller and more separated white spots on the fore wings.

There is another very handsome butterfly found on the Con-

PLATE IV.—BUTTERFLIES.

FIG. PAGE
1.—COMMA (*Vanessa C-album*) (UPPER AND UNDER SURFACE) … … 22
1*a*.—DITTO (LARVA AND PUPA)
2.—GLANVILLE FRITILLARY (*Melitæa Cinxia*) … … … … 25
2*a*.—DITTO (LARVA)
3.—GREASY FRITILLARY (*Melitæa Aurinia*) … … … … 25
4.—SMALL PEARL-BORDERED FRITILLARY (*Argynnis Selene*) … … 26
5.—QUEEN OF SPAIN FRITILLARY (*Argynnis Lathonia*) … … … 28
6.—DARK GREEN FRITILLARY (*Argynnis Aglaia*) … … … … 27
7.—SILVER-WASHED FRITILLARY (*Argynnis Paphia*) … … … 27
7*a*.—DITTO (LARVA)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7a

tinent, but not in England, which is called the **Poplar Butterfly** (*Limenitis Populi*, Linnæus), which, though allied to the White Admirals, more closely resembles various East Indian butterflies of the same group than any of our European species. The male is figured at Plate II., Fig. 7, and the female is similar, but has much larger white spots, which form a broad band on the hind wings.

It is a widely distributed insect in Europe, but like so many other butterflies of general distribution on the Continent, it does not extend to the north-western portion bordering on the English Channel. The poverty of Great Britain and Ireland in butterflies is therefore not due solely to our insular position, though this doubtless contributes to it, but to some other cause, which likewise affects the adjacent parts of Europe. North and north-west of Paris and Aix-la-Chapelle, butterflies are far less numerous in species than in other directions.

I have not seen this butterfly alive myself, but it is said to resemble the Purple Emperor in its habits, and to frequent damp places in roads in woods. It is, however, somewhat local and uncertain in appearance. The caterpillar feeds on White Poplar and Aspen.

Next to this butterfly is placed the Purple Emperor (*Apatura Iris*, Linnæus; Plate II., Fig. 6), but this belongs to a different section. The female is brown. The smooth green larva (Fig. 6*a*) has two non-retractile horns on the head, and oblique yellowish stripes on the sides. It feeds on sallow, but the butterfly likes to soar around the summits of the highest oaks and other forest trees in bright sunshine, though it will not unfrequently settle about puddles or on decaying animal substances. Many butterflies, large and small, especially white and blue ones, delight to settle on damp ground; and dung and carrion is very attractive to various tropical butterflies allied to the Purple Emperors and the White Admirals; but the Purple Emperor is perhaps the only British butterfly that shares this taste.

The Chrysippus butterfly (*Danaus Chrysippus*, Linnæus; Plate II., Fig. 5) is perhaps a little out of place in a book devoted to the butterflies and moths of Central Europe; for although it is common in Africa and the East Indies, as well as in the Canary Islands, it is only found in Europe in Greece. Its integuments are extremely tough, and it exhales an unpleasant odour when alarmed, which is supposed to protect it against the attacks of birds. The sub-family of butterflies to which it belongs is extremely numerous in the East Indies and the Eastern Islands, and has several representatives in Africa and America. The largest of the American species, called by American writers the Monarch (*Danaus Archippus*, Fabricius), is five inches across the wings, which are longer in proportion, and of a darker tawny brown than in Chrysippus. The Monarch is of very migratory habits, and has not unfrequently been captured in England, where it is possible that it may ultimately acclimatise itself, as it has already done in most of the South Sea Islands, as well as in Australia and New Zealand. The larvæ of these Danaid butterflies are very handsome, and are adorned with two or three pairs of long, slender, fleshy filaments, and their pupæ are often brilliantly metallic.

We now come to the extensive group of the Satyrs, which are brown butterflies of moderate size, frequenting woods, meadows and heaths. The wings of the Satyrs are generally of a slighter texture than those of the Angle-winged butterflies or the Purple Emperors, etc., which we have been discussing. Their smooth green caterpillars generally feed on various kinds of grass, and have a bifid tail. The under surface, at least, of the wings of these butterflies, is usually ornamented with round spots enclosed in rings of a different colour, and called "eyes" by collectors.

We have figured a female of the Grayling (*Hipparchia Semele*, Linnæus; Plate V., Fig. 5). The male is smaller, and is without the pale markings on the fore wings. It is chiefly found on dry heaths and open places in rocky woods, and is common on the Great Orme's Head in Wales, on the Sussex Downs, and in many other places. There are a considerable number of closely allied species in different parts of Europe, especially in the south and east.

Two species, not uncommon in Central Europe, but not found in Britain, are figured on Plate V. These are allied to the Grayling, but differ from it considerably in colour. *Hipparchia Circe*, Fabricius; Fig. 4) is a very handsome butterfly, frequenting dry, rocky woods and pastures in hilly districts. It is an insect of powerful flight, and, according to some writers, very difficult to capture; but this is not my own experience, as I have found it settle not unfrequently on flowers. The next species, however

(*Hipparchia Hermione*, Linnæus; Fig. 3), is much more difficult to catch. It is common in many places, flying about trees at the edges of woods or standing alone, never settling anywhere but on the trunks, from whence the slightest movement scares it. Most of the larger Satyrs, including the Grayling, have a habit of settling on tree-trunks, but they will also settle on stones or rocks, and sometimes on flowers or bushes. The Dryad (*Hipparchia Dryas*, Scopoli; Plate V., Fig. 6) is a species somewhat resembling our Ringlet (which will be noticed later), but is larger and is not British, though it is found throughout Europe and Asia from Normandy to Japan. We may mention incidentally that the Japanese representatives of European species which extend so far are generally larger than European ones. Like most of the larger Satyrs, this species is usually met with in dry rocky woods, and in similar localities, where it is sometimes very abundant.

There are a great number of brown butterflies on the Continent with red rings towards the margins of the wings, enclosing black spots with white centres. These are almost always confined to mountainous districts, sometimes at a great elevation, and several are found as far north as Lapland. Two or three, however, are found at a lower elevation than the others, but chiefly in hilly districts. One of these is the Scotch Argus (*Erebia Æthiops*, Esper, Plate V., Fig. 2), which, as its name denotes, is met with in Scotland and the north of England. A very similar species (*Erebia Ligea*, Linnæus), with whitish markings on the underside, is common on the Continent, and has been called the Arran Brown,

PLATE V.—BUTTERFLIES.

FIG. PAGE
1.—MARBLED WHITE (*Melanargia Galathea*) 33
2.—SCOTCH ARGUS (*Erebia Æthiops*) 32
3.—HERMIONE (*Hipparchia Hermione*) 32
4.—CIRCE (*Hipparchia Circe*) 31
5.—GRAYLING (*Hipparchia Semele*) 31
6.—DRYAD (*Hipparchia Dryas*) 32
7.—WALL BROWN (*Satyrus Megæra*) 33
8.—SPECKLED WOOD (*Satyrus Ægeria*, form *Egerides*) 33
9.—MEADOW BROWN (*Epinephile Janira*) 34
10.—BORDERED RINGLET (*Cœnonympha Arcania*) 35
11.—SMALL HEATH (*Cœnonympha Pamphilus*) 34

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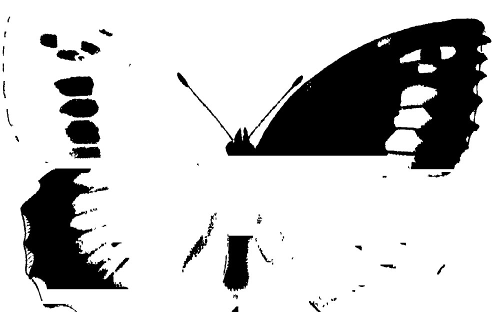
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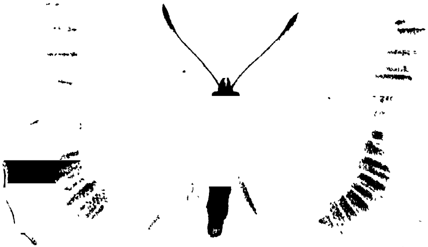
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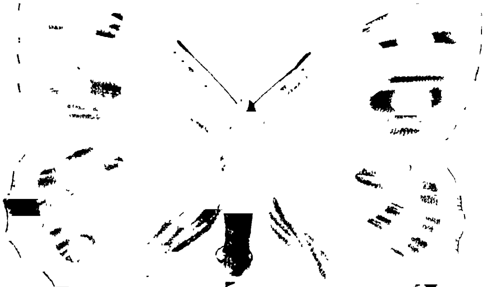
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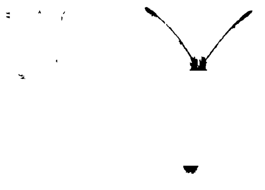
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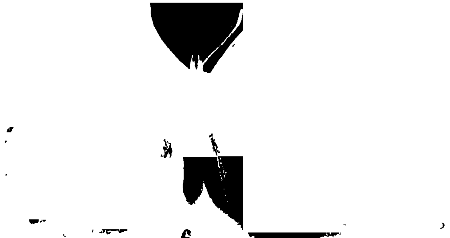
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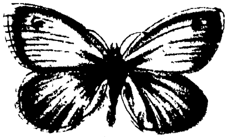
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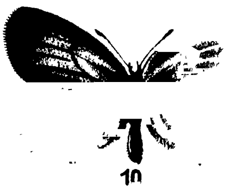
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owing to its having been stated, by some error, to have been found in the Isle of Arran, where, however, the Scotch Argus is particularly common. Another species, the Mountain Ringlet (*Erebia Epiphron*, Knoch), is hardly larger than a Small Heath, and is truly a mountain insect. It is found here and there on high mountains in Scotland and Ireland, and also in the north of England, but is never very abundant. All these butterflies have a peculiar black appearance when flying, and some of the Continental species have a slight purplish or greenish gloss over the dark wings.

The next species on our list is the Marbled White (*Melanargia Galathea*, Linnæus; Plate V., Fig. 1). It is extremely common on the Continent, but is very local in England, though abundant where it is found. It is found in meadows, and is fond of settling on flowers. Several allied species are found on the shores of the Mediterranean, but not in Northern or Central Europe.

We have now to notice the Speckled Wood Butterfly (*Satyrus Ægeria*, Linnæus, form *Egerides*, Staudinger; Plate V., Fig. 8), which, though somewhat local, is common in woods in many parts of this country throughout the year. The typical *Ægeria* is fulvous, and is a Mediterranean insect; ours is the paler Northern form.

Another butterfly, which is closely related to this, is the Wall Brown (*Satyrus Megæra*, Linnæus; Plate V., Fig. 7). It is much commoner and more widely distributed than the Speckled Wood, and is particularly abundant in country lanes. It is also fond of sunning itself on walls, where it is very conspicuous.

The Ringlet (*Epinephele Hyperanthus*, Linnæus) is a blackish-brown butterfly about the size of the Scotch Argus, with a variable number of eye-spots in yellow rings on the under surface of the wings, and frequently more or less distinctly above, especially in the female; it is common about bushes in the summer in open places in woods.

The Meadow Brown (*Epinephele Janira*, Linnæus; Plate V., Fig. 9) is one of the commonest of all our butterflies, and is abundant everywhere in June and July in open grassy places. The tawny patch on the fore wings of the female, represented in our illustration, is absent in the male. A somewhat less abundant, but still fairly common butterfly, which appears at the same time as the Meadow Brown, to which it is allied, is the Large Heath (*Epinephele Tithonus*, Linnæus), which frequents hedgerows and open woods. It is about an inch and a half in expanse, and is of a brown colour, with the centre of the wings filled up with bright tawny. There is a round black spot, containing two white dots towards the tip of the fore wing. The male is smaller than the female, and has an oblong brownish patch on the hinder portion of the fulvous part of the fore wings.

The Small Heath (*Cœnonympha Pamphilus*, Linnæus; Plate V., Fig. 11) is a little tawny butterfly, which is common almost everywhere in grassy places; the eye-spots on the underside of the hind wings are rudimentary.

We have figured another species of this group, the Bordered Ringlet (*Cœnonympha Arcania*, Linnæus; Plate V., Fig. 10), which has very distinct eye-spots towards the margins of the hind wings beneath. It is a common woodland insect on the Continent, but though it has been stated to have been found several times in England, it is not generally recognised as a British species. There are several other allied species in Europe, and one, the Marsh Ringlet (*Cœnonympha Typhon*, Rottemburg), is about the size of the Bordered Ringlet, but is paler, more of the colour of the Small Heath. It frequently has more or less distinct eye-spots on the upper surface of the hind wings, as well as on the underside. It is found locally in various parts of the north of England and Wales, as well as in Scotland and Ireland, but not in the south of England. It frequents swampy places, where its larva feeds on cotton-grass.

THE NETTLE-TREE BUTTERFLY, AND THE DUKE OF BURGUNDY FRITILLARY.

The next two families (the *Libytheidæ and Erycinidæ*) are represented in Europe by only one species each. Both families have six perfect legs in the females, while the first pair of legs is rudimentary in the males. The second family comprises hundreds of species in South and Central America; but is represented in Asia, Africa, and even North America by a very small number, and as we have said, in Europe by one only.

The Nettle-tree butterfly (*Libythea Celtis*, Linnæus) has something of the appearance of one of the Angle-winged Butterflies, but may easily be distinguished from them by the curious beak projecting between the short thick antennæ (Plate VI., Fig. 1). This is formed by the unusual development of one pair of the organs called palpi, which are generally but slightly developed, though distinctly visible, in other butterflies. This butterfly is only met with south of the Alps. The group to which it belongs contains very few species, but is very widely distributed, having representatives in all the principal divisions of the world.

The next species, the Duke of Burgundy Fritillary (*Nemeobius Lucina*, Linnæus; Plate VI., Fig. 2) derives its name from its resemblance in colour and general appearance to the Fritillaries, with which, however, it has no other relationship. The butterfly is found in open woods, where its reddish-brown, tufted larva feeds on primroses.

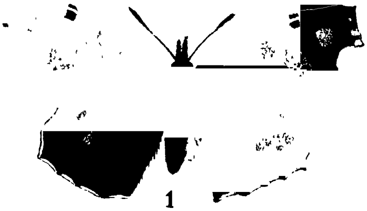
THE BLUES, COPPERS, AND HAIR-STREAKS.

We now come to an extensive series of rather small butterflies, in which all the legs are fitted for walking in both sexes, though the front legs are usually smaller than the others, and the extremity consists, in the males, of a single joint, spined beneath, and terminating in a single claw.

The Blue butterflies are very numerous on the Continent, and even in England we have about a dozen species. Most of these have blue males and brown females, though in many cases the females are more or less blue, while in others both sexes are brown. Many of the species are found (in England) almost

PLATE VI.—BUTTERFLIES.

FIG. PAGE
1.—Nettle-Tree Butterfly (*Libythea Celtis*) ... 35
2.—Duke of Burgundy Fritillary (*Nemeobius Lucina*) ... 36
3.—Brown Hair-streak (*Zephyrus Betulæ*) ... 41
4.—Black Hair-streak (*Thecla Pruni*) ... 41
5.—Scarce Copper (Male) (*Lycæna Virgaureæ*) ... 40
5*a*.—Ditto (Female)
6.—Common Copper (*Lycæna Phlæas*) ... 40
7.—Silver-studded Blue (Male) (*Polyommatus Ægon*) ... 39
7*a*.—Ditto (Female)
8.—Azure Blue (Male) (*Polyommatus Argiolus*) ... 37
8*a*.—Ditto (Female)
9.—Bedford Blue (*Polyommatus Minimus*) ... 37
10.—Large Blue (*Polyommatus Arion*) ... 37
11.—Large Brown Skipper (*Spilothyrus Alceæ*) ... 42
12.—Grizzled Skipper (*Hesperia Malvæ*) ... 42
13.—Pearl Skipper (*Pamphila Comma*) ... 43
14.—Chequered Skipper (*Cyclopides Palæmon*) ... 42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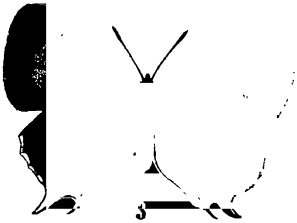
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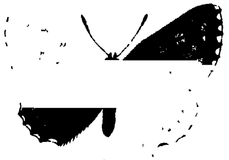
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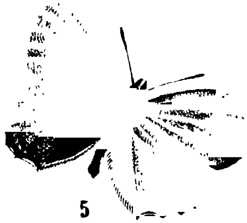
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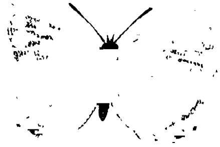
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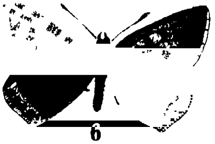
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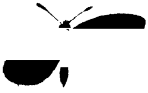
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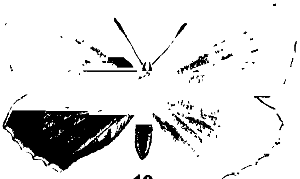
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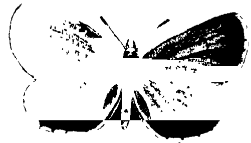
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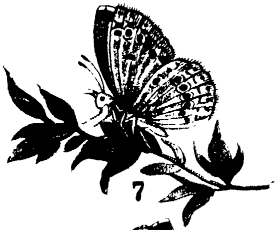
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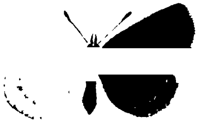
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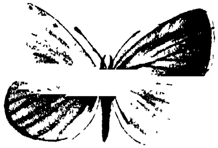
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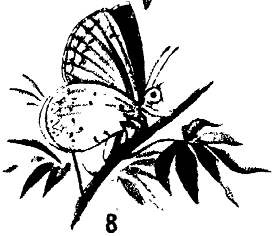
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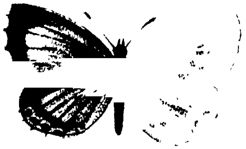
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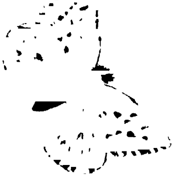
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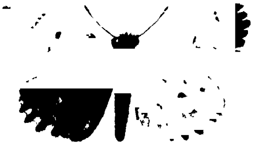
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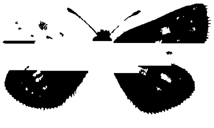
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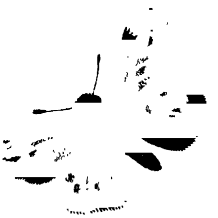
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to which it belongs, and can easily be recognised by the peculiar markings of the underside; it is also remarkable for the unusual difference between the sexes, which may be seen in our figures. It is double-brooded, and feeds on holly and ivy, and appears earlier in the spring than any of its allies. It is a fairly common insect, and is often seen in suburban gardens; but in some parts of the country (near Brighton, for instance) it is considered somewhat of a rarity. Closely allied species are found throughout Asia and North America.

The Common Blue (*Polyommatus Icarus*, Rottemburg) may be noticed almost everywhere in open flowery places throughout the summer. The male is blue above, with white fringes bordered within by a fine black line, and the underside is ornamented with many blackish spots in white rings, and a row of marginal red spots. The female is brown, more or less blue, above, and with marginal red spots on the upper surface. Two other species are found in the Downs in the south of England, in which the fringes are spotted alternately with black and white. One is the Clifden Blue (*Polyommatus Bellargus*, Rottemburg), which is of a very brilliant blue in the male, and the other is the Chalk-hill Blue (*Polyommatus Corydon*, Poda), in which the male is of a pale silvery blue. The females of both these butterflies are brown, and very much alike.

There is a small butterfly allied to the Common Blue called the Brown Argus (*Polyommatus Astrarche*, Bergstraesser). Both sexes are brown, with a very distinct row of marginal red spots on all the wings, above as well as below. This butterfly is very like the brown variety of the female of the Common Blue, but may be distinguished not only by the somewhat different character of the markings, but by the absence of two basal spots on the underside of the fore wings which are usually present in the Common Blue. In Scotland a local form of this species is found, called the Artaxerxes Butterfly (*Polyommatus Artaxerxes*, Fabricius), which has a white spot in the centre of the fore wings above, and on the underside the usual ocellated spots have become almost wholly white. This is almost the only British butterfly, except the Large Copper, which appears not to be found on the Continent; for though the marginal orange spots on the upper side of the wings are less distinct in Artaxerxes than in the usual form of the species, Continental varieties—in some of which the marginal spots are almost entirely absent—show no traces of the white spot of the upper side, nor of the white suffusion of the ocellated spots on the underside. The form without orange spots is called the variety *Allous* of Hübner, and appears constantly as the second brood in Southern Europe. In Britain the butterfly is double-brooded in the south, and single-brooded in the north.

The Silver-studded Blue (*Polyommatus Ægon*, W. V.; Plate VI., Fig. 7, male, upper and under side; Fig. 7*a*, female) is common on heaths in many parts of the British Islands, and is remarkable for a row of small, bright metallic points towards the margin of the hind wings beneath.

Among the Continental Blues which are not found in England are several interesting species, some with the underside of the hind wings green, and others with a conspicuous white stripe running across them from the base. There are also several species with short tails to the hind wings, two of which have been taken in England, but very rarely. The most interesting of these, the Tailed Blue (*Polyommatus Bæticus*, Linnæus) is common in Asia, Africa, and Southern Europe, and is the European representative of an important group of Indian species. It is violet-blue above, with two black spots at the base of the tail, and the female is brown. The underside is streaked with brown and white, and the two spots mentioned are marked with metallic green and orange. In some years a few stragglers of this butterfly are seen in the Channel Islands and on the south coast o England.

The larvæ of the Copper butterflies feed on sorrel and dock. The Small Copper (*Lycæna Phlæas*, Linnæus; Plate VI., Fig. 6) is common in gardens and meadows during a great part of the year. The Large Copper (*Lycæna Dispar*, Haworth), which resembles the species next to be noticed, but is still larger, used to be found in the fens of the Eastern counties, but it is now feared that it is quite extinct. Numerous other species are found on the Continent, and the butterfly called the Scarce Copper (*Lycæna Virgaureæ*, Linnæus), and figured on Plate VI., Figs. 5 and 5*a*, though common on the Continent, where it is found in meadows and open places in woods, has occasionally, though very rarely, been taken in the Eastern counties of England, and is perhaps not yet quite extinct. It may be known from any other species of the genus by having some white markings on the underside of the hind wings.

The Brown Hairstreak (*Zephyrus Betulæ*, Linnæus; Plate VI., Fig. 3) is found in autumn in bushy places in various parts of England and Ireland, but is a rather local and somewhat scarce insect. The male is destitute of the orange band on the fore wings shown in our figure. Another species, the Purple Hairstreak (*Zephyrus Quercus*, Linnæus), is not unlike the last in size and shape, and is common in oak woods in July. Although Hairstreaks will settle on the blossoms of the bramble and other flowers, yet, as a rule, they prefer to perch on leaves, like the South American butterflies allied to the Duke of Burgundy Fritillary. In the Purple Hairstreak the wings are of a rather dull blue in the male, narrowly bordered with brown; and in the female brown, with a bright blue patch towards the base of the fore wings.

There are several other smaller Hairstreaks found in Europe, three of which are British. These are the Black Hairstreak (*Thecla Pruni*, Linnæus) figured at Plate VI., Fig. 4, a very local insect which frequents sloe bushes; the White-letter Hairstreak (*Thecla W-album*, Knoch), a more widely distributed but still local insect, very like the last, but distinguished by the white line on the wings beneath, which forms a very distinct W at the lower end of the hind wings; and the Green Hairstreak (*Thecla Rubi*, Linnæus), a smaller butterfly, without the short tail which distinguishes the other species. The last butterfly is brown above and bright green below, and is found about bramble bushes in spring.

THE SKIPPERS.

This name is applied to an extensive group of butterflies which are considered to approach nearer to the moths than the others. They have a large head, with the antennæ placed widely apart instead of close together, and the wings are rather small compared to the comparatively stout body. They have six perfect legs in both sexes, and the pupa is often wrapped in a leaf, or enclosed in a sort of rudimentary cocoon. The butterflies have a rapid, jerky flight, which is seldom long sustained. Eight species are found in England, and about thirty on the Continent, the majority of the Continental species being allied to our Grizzled Skipper.

The Large Brown Skipper (*Spilothyrus Alceæ*, Esper; Plate VI., Fig. 11) is common on the Continent, where the larva feeds on mallow. It differs from any of our British species in having some small transparent spots towards the tips of the fore wings, a character shared by a great number of foreign Skippers.

The Grizzled Skipper (*Hesperia Malvæ*, Linnæus; Plate VI., Fig. 12) is very common in open grassy places in woods; the larva feeds on wild raspberry.

The Chequered Skipper (*Cyclopides Palæmon*, Pallas; Plate VI., Fig. 14) is a very local species, especially in England. It is found in grassy places in woods, and does not greatly resemble any other European species.

The Pearl Skipper (*Pamphila Comma*, Linnæus; Plate VI., Fig. 13) is local, but is very abundant where it is met with at all, especially in dry places on the South Downs and elsewhere. It is easily recognised by the hind wings, which are green beneath, with square white spots. It is very similar to another insect called the Large Skipper (*Pamphila Sylvanus*, Esper), which is common on the borders of woods; but in the latter the pale spots of the under surface are yellowish, not white. In the females of both species, the dark streak on the fore wings, shown in our figure, is absent.

The other British Skippers are rather small insects, hardly equalling the last in size, and with the exception of the Dingy Skipper (*Nisoniades Tages*, Linnæus), which is brown, with indistinct spots, are all of a tawny colour.

Part II.

HAWK-MOTHS.

As we have seen, Linnæus included all the butterflies in his genus *Papilio,* and the moths he classed under two other genera, which he called *Sphinx* and *Phalæna.* These were again divided into several sections. The name Sphinx was derived from the Sphinx-like attitude assumed by the caterpillar of the Privet Hawk-moth when at rest, when it often raises its head and the fore part of its body much more than is shown in our figure (Plate VII., Fig. 2*a*).

THE STOUT-BODIED HAWK-MOTHS.

The true Hawk-moths form a very well-defined and natural section, but the chief character on which Linnæus relied to separate them from the Moths proper consisted in the antennæ being thicker in the middle than at either extremity; and this led him to associate with the true Hawk-moths the Clear-wings and Burnets, which have no real relationship with them.

The Death's Head Hawk-moth (*Acherontia Atropos,* Linnæus) is the largest of all the British butterflies and moths, and with one exception it is also the largest moth found in Europe. It is figured, with its larva, on Plate VII., Figs. 1 and 1*a*. It

PLATE VII.—HAWK-MOTHS.

FIG. PAGE
1.—Death's Head Hawk-Moth (*Acherontia Atropos*) 44
1*a*.—Ditto (Larva)
2.—Privet Hawk-Moth (*Sphinx Ligustri*) 45
2*a*.—Ditto (Larva)
3.—Pine Hawk-Moth (*Sphinx Pinastri*) 46

1a
1
3
2
2a

is a wide-ranging insect, which is found throughout Europe, Africa, and Northern, Central, and Western Asia, while it is represented in Southern and Eastern Asia by one or two other very closely allied species. Like many others of the larger Hawk-moths, it is much more numerous in some years than in others, and although the larva feeds on a variety of native and imported plants, such as buckthorn, thornapple, jasmine, etc., its favourite food at present is the potato, and consequently the larva and the dark-brown subterranean pupa are often met with by persons who are digging potatoes, though the insects are not always very easily reared when found. It is not sufficiently common to do any real injury to the potato crop.

A commoner insect, at least in the south of England, is the Privet Hawk-moth (*Sphinx Ligustri*, Linnæus), figured, with its larva, on Plate VII., Figs. 2, 2*a*. The larva feeds on several other trees besides privet (lilac, holly, and ash, for example), and notwithstanding the size and beauty of the caterpillar, its colours harmonise so well with those of the green leaves among which it lives that it might easily be overlooked, even by the entomologist, who is sometimes guided to the discovery of the caterpillars by noticing their droppings under the bushes on which they feed.

A larger and duller coloured Hawk-moth is the Convolvulus Hawk-moth (*Sphinx Convolvuli*, Linnæus), which is sometimes captured flying over petunias and other flowers in the autumn. It is commoner in some years than in others, but is an abundant insect throughout Europe, Asia, and Africa. Ir

England it is only common in certain years. Its larva feeds on convolvulus. The moth is remarkable for the great length of its proboscis.

The Pine Hawk-moth (*Sphinx Pinastri*, Linnæus; Plate VII., Fig. 3) is a very abundant insect in the neighbourhood of the great pine forests in Germany, where it is found flying over flowers in the evening, or resting on tree-trunks in the daytime, where it is easily detected by a practised eye. Towards the beginning of the nineteenth century several specimens were captured near Esher and Edinburgh; but for perhaps sixty or seventy years no more British specimens were seen, and the moth was actually erased from the British lists by many entomologists; but within the last few years British specimens have again been obtained in the neighbourhood of Harwich and elsewhere.

The Spurge Hawk-moth (*Deilephila Euphorbiæ*, Linnæus; Plate VIII., Fig. 2) is another species of great rarity in England. About 1815 many larvæ were met with on sea-spurge on the coast of Devon, but, strange to say, the insect has not since been seen there, and recent captures of the moth or larva in England have been very few and far between. On the Continent it is very common. The larva is figured on Plate VIII., Fig. 2*a*. It is liable to the attacks of various parasites, such as ichneumon flies and the bristly two-winged flies of similar habits, and is therefore somewhat difficult to rear. It is probably poisonous to many birds on account of the nature of its food. However, I think I have read somewhere that seagulls feed on caterpillars which live on the spurge growing among the sandhills of the French coast. There are several other Hawk-moths closely allied to this, which are found in Europe, but the only two of these which visit England are of considerable rarity, though they are more frequently met with than the Spurge Hawk-moth.

The Hawk-moths are insects of powerful flight, and sometimes of wide distribution, several species migrating northwards beyond their usual haunts in certain seasons. Among these are the beautiful Oleander Hawk-moth (*Chœrocampa Nerii*, Linnæus; Plate VIII., Fig. 1) and the Sharp-winged Hawk-moth (*Chœrocampa Celerio*, Linnæus; Plate VIII., Fig. 3). Both these species are common in Africa and the East Indies, and are also indigenous in Southern Europe, whence specimens occasionally wander to our shores. There are perhaps about twenty specimens of the Oleander Hawk-moth which have been taken in England from time to time, hovering over flowers at dusk in the autumn. The Sharp-winged Hawk-moth has been found in England much more frequently, but yet is always to be considered a great rarity. It is closely allied to a number of very similar species found in Asia and Africa. Its larva feeds on vine.

The Elephant Hawk-moth (*Chœrocampa Elpenor*, Linnæus; Plate VIII., Fig. 4) is a fairly common species in England. Its larva (Plate VIII., Fig. 4*a*) feeds on willow-herb, and has given its name to the moth, and to several allied species, because the front portion of the body is retractile, and when retracted gives this portion of the caterpillar somewhat of the appearance of an elephant's trunk; or a pig's snout, as the word *Chœrocampa* (derived from the Greek, which is used for the genus to which this insect belongs) denotes.

The Small Elephant Hawk-moth (*Chœrocampa Porcellus*, Linnæus; Plate VIII., Fig. 5) is also a fairly common species in the British Islands (I have taken it at honeysuckle at dusk on the Hill of Howth, near Dublin), and the larva feeds on bedstraw.

There are three conspicuous species of Hawk-moths found in the British Islands in which the proboscis is much shorter than in any of the foregoing. The outlines of the wings are also much more irregular, and the flight of the insects is slow and heavy. The first of these is the Lime Hawk-moth (*Smerinthus Tiliæ*, Linnæus; Plate VIII., Fig. 6), and the second is the Poplar Hawk-moth (*Smerinthus Populi*, Linnæus; Plate IX., Fig. 1). Both these may be found in most localities in Britain, or on the Continent, wherever the trees on which the caterpillars live are abundant. The third species, the Eyed Hawk-moth (*Smerinthus Ocellatus*, Linnæus; Plate IX., Fig. 2) feeds on apple as well as on willow and poplar, and is sometimes regarded as an injurious insect. The Lime Hawk-moth varies considerably in colour, sometimes being greenish and sometimes more yellow, and it has no very near ally. Some exceedingly fine insects, allied to the Poplar Hawk-moth, are found in Algeria, and a great variety of species resembling the Eyed Hawk-moth are found in North America, where no species resembling the Lime and Poplar Hawk-moths are to be met with.

The Green Humming-bird Hawk-moth (*Pterogon Proserpina*,

PLATE VIII.—HAWK-MOTHS.

FIG PAGE

1.—Oleander Hawk-Moth (*Chærocampa Nerii*) 47

2.—Spurge Hawk-Moth (*Deilephila Euphorbiæ*) 46

2*a*.—Ditto (Larva)

3.—Sharp-winged Hawk-Moth (*Chærocampa Celerio*) 47

4.—Elephant Hawk-Moth (*Chærocampa Elpenor*) 47

4*a*.—Ditto (Larva)

5.—Small Elephant Hawk-Moth (*Chærocampa Porcellus*) 48

6.—Lime Hawk-Moth (*Smerinthus Tiliæ*)... 48

1
2
2a
5
3
6
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Pallas; Plate IX., Fig. 3) is not a British species. It is not uncommon in the southern half of Central Europe, but becomes scarce towards the north. The caterpillar feeds on evening primrose and willow-herb, and the moth flies at dusk.

It is probable that the Humming-bird Hawk-moth (*Macroglossa Stellatarum*, Linnæus; Plate IX., Fig. 4) has often attracted the attention of persons who were not entomologists, and who have perhaps never noticed any other species of the group. It is common in gardens, where it flies over flowers, never stopping to rest, but probing them with its long proboscis, exactly as the real humming-birds probe flowers with their long beaks. Many people who were not entomologists have insisted that they have actually seen humming-birds in England, meaning this insect. Numerous species allied to ours are found throughout the world, and those which are found in the same countries as real humming-birds cannot be distinguished from them on the wing, for their rapid movements and the vibration of their wings only allow of the perception of a hazy shadow hovering over the flower. The larva of our British species feeds on bedstraw.

We have two more Hawk-moths in England which much resemble the Humming-bird Hawk-moth in size, appearance and habits, but they differ in having transparent wings with purplish-brown borders. They are called the Broad-bordered and the Narrow-bordered Bee Hawk-moths respectively (*Hemaris Bombyliformis*, Ochsenheimer, and *H. Fuciformis*, Linnæus), and the former is figured on Plate IX., Fig. 5. They are found in May, flying over flowers in the sunshine, in woods and flowery meadows, and are not uncommon; they are, however, much less rapid on the wing than the Humming-bird Hawk-moth.

THE CLEAR-WINGS.

We now come to a very curious group of transparent-winged moths, whose larvæ do not feed openly on the leaves of plants, but feed inside the stems or roots of plants and trees.

The largest of these species is the Hornet Clear-wing (*Trochilium Apiforme*, Linnæus; Plate IX., Fig. 6), which is so much like a wasp that even an entomologist who knew very well what it was might well be afraid to touch it if he saw it sunning itself on the trunk of a poplar, as it is accustomed to do in May and June. It is, however, a perfectly harmless insect, and one which is fairly common in many places. Another and rather smaller species, the Lunar Hornet-moth (*Trochilium Crabroniforme*, Lewin) is common in England in osier beds, though it is a very scarce and local insect on the Continent.

There are a considerable number of smaller moths with transparent wings which are found both in England and on the Continent. Many of the species are seldom noticed, partly owing to their being overlooked from their resemblance to flies; but entomologists who have studied their habits frequently rear them from the larva, or pupa, notwithstanding the difficulties presented by their habits as internal feeders. The wings of these moths, especially the hind wings, are more or less transparent, and the abdomen is adorned with red, yellow, or white belts, varying in number according to the species.

The Clear Under-wing (*Sciapteron Tabaniforme*, Rottemburg) belongs to a rather different group from any of the following species. The body is bluish-black, with three or four yellow belts on the abdomen, and the fore wings, which measure an inch and a quarter in expanse, are dark brown, slightly transparent towards the base, and the hind wings are transparent, bordered with brown. It is widely distributed on the Continent, and used to be taken occasionally round London during the first half of the nineteenth century, but it appears to have become extinct, for no specimen is recorded as having been taken in England for many years. Why it should have utterly disappeared from this country it is difficult to guess, for the larva feeds in the branches and roots of the black poplar and aspen, which are very common trees in England;

The Large Red-belted Clear-wing (*Sesia Culiciformis*, Linnæus Plate IX., Fig. 7) is one of the commoner species in England, and the moth frequents flowers, or is seen flying round tree-stumps. Many species of the group are in the habit of frequenting elder, lilac, and other flowers, but as these flowers are also visited by a variety of other insects about which collectors of butterflies and moths seldom concern themselves, the Clear-wings are easily overlooked in the crowd. The larva of the species we are discussing forms a long gallery in the wood of the birch.

The commonest of the small Clear-wings in England is the Currant Clear-wing (*Sesia Tipuliformis*, Linnæus), a yellow-belted species, with some orange markings on the wings, the larva of which feeds on the pith of currant bushes, to which it is very injurious. It has been met with in North America, and even in New Zealand, doubtless introduced with currant bushes.

The Many-belted Clear-wing (*Bembecia Hylæiformis*, Laspeyres; Plate IX., Fig. 8) is a Continental species which has not yet been found in England, and which is said to fly by night, contrary to the habit of most of the allied species. Its larva lives in the stem and roots of the raspberry.

THE FORESTERS AND BURNETS.

These moths are green, green and red, or black and white, and are much more numerous in species in the countries bordering on the Mediterranean than in Central and Northern Europe. As the antennæ are generally more or less thickened in the middle, Linnæus included the species with which he was acquainted in the genus Sphinx. Most of the species fly heavily by day in meadows, while those few which have a stronger flight prefer to sport round bushes.

The Small Forester (*Aglaope Infausta*, Linnæus; Plate IX., Fig. 15) is common in South France and Italy, where its larva feeds on plum, sloe, apricot, etc., and is sometimes a great pest. In Germany it is found near Kreuznach, and in some adjacent districts. It has never been met with in England.

The Green Forester (*Ino Statices*, Linnæus; Plate IX., Fig. 9) is a very pretty insect when it is newly emerged from the pupa.

PLATE IX.—HAWK MOTHS, ETC.

FIG. PAGE

1.—Poplar Hawk-Moth (*Smerinthus Populi*) 48

2.—Eyed Hawk-Moth (*Smerinthus Ocellatus*) 48

3.—Green Humming-Bird Hawk-Moth (*Pterogon Proserpina*) ... 49

4.—Humming-Bird Hawk-Moth (*Macroglossa Stellatarum*) 49

5.—Broad-bordered Bee Hawk-Moth (*Hemaris Bombyliformis*) ... 49

6.—Hornet Clear-Wing (*Trochilium Apiforme*) 50

7.—Large Red-belted Clear-Wing (*Sesia Culiciformis*) 51

8.—Many-belted Clear-Wing (*Bembecia Hylæiformis*) 52

9.—Green Forester (*Ino Statices*) 52

10.—Broad-bordered Five-spot Burnet (*Zygæna Trifolii*) 54

11.—Irish Burnet (*Zygæna Minos*) 54

12.—Ocellated Burnet (*Zygæna Carniolica*) 55

13.—Belted Burnet (*Zygæna Ephialtes*, var. *Coronillæ*) 55

14.—Yellow-belted Burnet (*Syntomis Phegea*) 56

15.—Small Forester (*Aglaope Infausta*) 52

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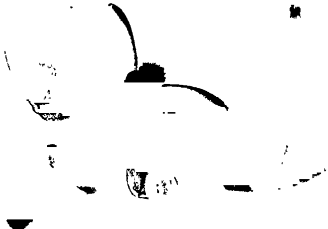

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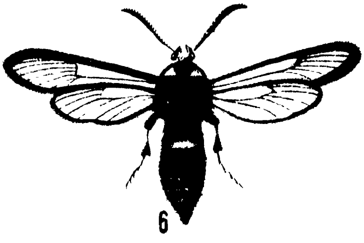

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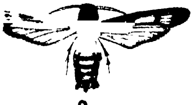

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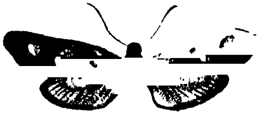

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It may be found abundantly in meadows in various places in Britain, though it is somewhat local. When I have met with it myself, it has generally been in meadows adjoining woods. It flies rather heavily, and often rests motionless on flowers, like many of the day-flying moths. There are a considerable number of species allied to this insect found in Europe and the adjacent parts of Asia and Africa. They are all very similar, and are distinguished more by the shape and structure of the antennæ than by any other characters. Two of these species, the Scarce Forester (*Ino Globulariæ*, Hübner) and the Cistus Forester (*Ino Geryon*, Hübner) are very common in dry places in the south of England, on the South Downs, and elsewhere, but only in a very few favoured localities. The larvæ generally feed on low plants, such as sorrel or cistus, but there are some rather curious exceptions among the species which are not British. One widely distributed species is said to feed on heath in the north and on sloe in the south of Europe—an interesting variation of habit, if the statement is correct.

The Burnet moths are very conspicuous insects, on account of their bright colours and diurnal habits, though they are not remarkable for their size. A great number of species are found in Europe and the adjacent countries, and are all very similar, the prevailing colour of the fore wings being dark green, with bright red streaks or spots, and that of the hind wings being red, bordered with purple. Sometimes the red markings are replaced by yellow, as may also be the case in several of the Tiger-moths, which are usually red. The commonest species, the

Six-spot Burnet (*Zygæna Filipendulæ*, Linnæus) is abundant in meadows and on grassy slopes in most parts of the country, where it flies low down from flower to flower, frequently resting. Two or three or even more specimens may often be seen sitting motionless on the same flower-head. The larvæ feed on vetch, trefoil, and similar plants; and the pupæ are enclosed in a long narrow case of straw-coloured silk, pointed at both ends. There are many species of Burnets with five spots on the wings, the lower spot of the third pair which we find in the Six-spot Burnet being obsolete. They are distinguished from each other by the comparative size and arrangement of the spots, the width of the border of the hind wings, the hairiness of the body, and other characters. They are much scarcer and more local in Britain than the Six-spot Burnet, and are more confined to marshy meadows than that species. The commonest of these, the Broad-bordered Five-spot Burnet (*Zygæna Trifolii*, Linnæus) is shown on Plate IX., Fig. 10. Another species, remarkable for its hairy body and thinly scaled wings, is called the Mountain Burnet (*Zygæna Exulans*, Piller). It is very abundant in the Alps and other high mountains of the Continent, but up to the present time only a single locality has been found for it in the British Islands—in the neighbourhood of Braemar.

The Irish Burnet (*Zygæna Minos*, W. V.; Plate IX., Fig. 11) is a species belonging to a different section. It is far more widely distributed on the Continent than in Britain. In Britain it may be termed a purely Celtic insect, being most abundant near Galway and other places in the west of Ireland, though it has also been found of late years in Great Britain; first in the west of Scotland and more recently in South Wales. I have also heard of a strange Burnet, which will probably prove to be this species, having been taken at Tintagel in Cornwall, but I have not yet been able to obtain further information respecting it.

The Ocellated Burnet (*Zygæna Carniolica*, Scopoli; Plate IX., Fig. 12) belongs to a section not represented in Britain, in which the red spots of the fore wings are surrounded with pale borders. It is a variable species, and is common in the southern portions of Central Europe; in the north it is scarce and local, and absent in the north-west. In some localities it is said to be only found on the chalk.

The Belted Burnet (*Zygæna Ephialtes*, Linnæus; Plate IX., Fig. 13) is a species which is very widely distributed in Europe, though it is not British. It is remarkable for the great variation of colour in different races. Sometimes the spots of the fore wings are red, the hind wings are red with a black border, and there is a red belt round the body; sometimes these markings are replaced by yellow; sometimes the spots on the fore wings are white, as in our figure, the pair at the base being yellow, and the belt is likewise yellow; sometimes the basal spots are red, as well as the belt. The extremity of the antennæ is generally whitish, and there are varieties corresponding to the various forms which we have mentioned, which only differ from them in having five spots on the fore wings instead of six. The variety figured is called *Zygœna Coronillœ*, W. V. The Yellow-belted Burnet (*Syntomis Phegea*, Linnæus; Plate IX., Fig. 14) somewhat resembles the Belted Burnet in its colours, but differs altogether in the structure of the antennæ, which are much longer and more slender than in either the true Burnets or the Foresters. This insect is the European representative of a group which is very numerous in species in the tropics of the Old World. It is a gregarious insect which is very common in Italy and Eastern Europe, but in France, Germany, and the Netherlands it is only met with in a very few widely separated localities. It is a day-flying insect, but is by no means a sluggish insect like the Burnets, which fly lazily from flower to flower in the meadows. Instead of this it is an active insect found in open woods, though its larva feeds on various low plants.

PLATE X.—MOTHS.

FIG. PAGE

1.—Large Footman (*Œonistis Quadra*) 57

2.—Crimson-speckled Footman (*Deiopeia Pulchella*) 58

3.—Cinnabar Moth (*Euchelia Jacobææ*) 58

4.—Wood Tiger (*Nemeophila Plantaginis*) 59

5.—Scarlet Tiger Moth (*Callimorpha Dominula*) 58

6.—Tiger Moth (*Arctia Caja*) 59

6*a*.—Ditto (Larva)

7.—Cream-spot Tiger (*Arctia Villica*) 59

8.—Spotted Tiger Moth (*Arctia Purpurea*) 60

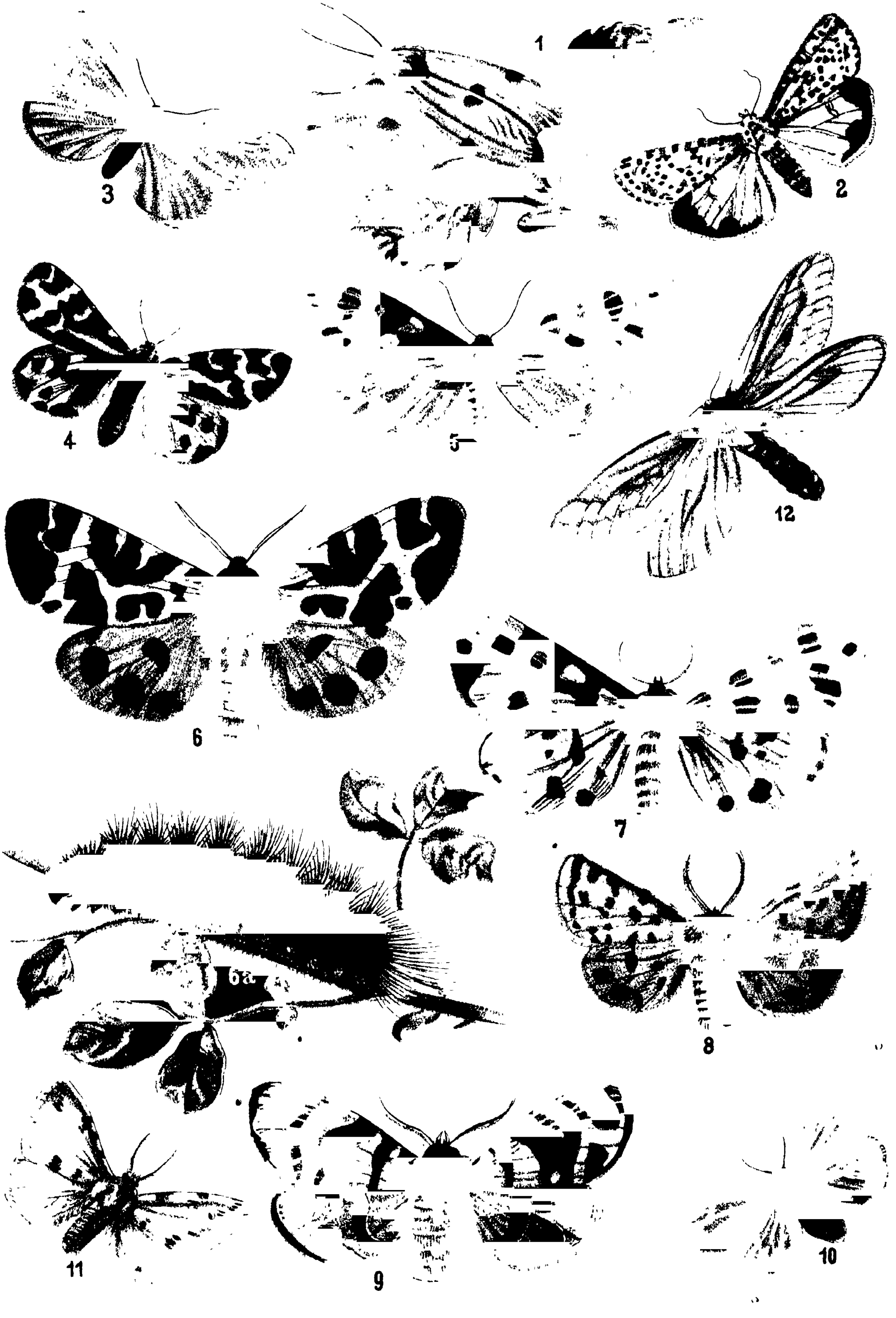
9.—Hebe Tiger Moth (*Arctia Hebe*) 60

10.—Ruby Tiger Moth (*Phragmatobia Fuliginosa*) 60

11.—Buff Ermine (*Spilosoma Lubricipeda*) 61

12.—Ghost Moth (*Hepialus Humuli*) 64

Plate X.



Part III.

MOTHS.

THE FOOTMEN AND TIGER-MOTHS.

The Footmen are slender-bodied moths of dull colours, and their larvæ feed on lichens. The Common Footman (*Lithosia Lurideola*, Zincken) may be taken as a representative of the typical genus of the Footmen. It measures about an inch and a quarter across the fore wings, which are dark leaden-grey, with a yellow stripe along the front edge terminating in a point, and the hind wings are also yellow. There are several other species closely allied to this. At rest the wings overlap, and the insect has a flattened appearance. If beaten from a hedge it drops down as if dead.

We have figured the female of the Large Footman (*Œonistis Quadra*, Linnæus) on Plate X., Fig. 1. The male is very dissimilar, the fore wings being pale greyish-yellow, with the base orange, and a bluish line along the front of the wing. It is not an uncommon species, and may sometimes be found resting on tree-trunks in the daytime.

The Tiger-moths are among the most brilliantly coloured of our native species, and many of them are common insects. Their tufted larvæ feed on a variety of low plants. They are usually stout-bodied insects, and the antennæ are generally more or less pectinated in the males.

The Crimson-speckled Footman (*Deiopeia Pulchella*, Linnæus; Plate X., Fig. 2) is somewhat intermediate between the Footmen and the Tiger-moths. It is a very common species throughout Africa and the south of Europe and Asia, but becomes scarce in the north, and is a great rarity in England, though it has been occasionally taken on the Surrey Downs, and in other places in the south. It is a day-flying insect, and is said sometimes to be found in stubble fields.

The Cinnabar moth (*Euchelia Jacobææ*, Linnæus; Plate X., Fig. 3) much resembles the Burnet moths in its colours, though in other respects it differs widely. The larva is black, ringed with yellow, and feeds gregariously on ragwort, and the moth is fairly common in many localities throughout the British Islands. Like most brightly coloured insects with comparatively slender bodies, it flies during the day.

The Scarlet Tiger-moth (*Callimorpha Dominula*, Linnæus; Plate X., Fig. 5) is one of the most brightly coloured of the group. The larva feeds on low plants, and, like the moth, is most abundant in fen districts and swampy places; but it is not considered a rarity in England, though it is decidedly scarce.

The Jersey Tiger-moth (*Callimorpha Hera*, Linnæus) is one of the most familiar species on the Continent, because it flies by day in open flowery places. In the Channel Islands it is not uncommon;

but although specimens have been occasionally captured in the southern counties of England, it was not till a few years ago that it was found in some numbers in Devonshire. It is about the same size as the Scarlet Tiger, but the wings are broader. The fore wings are dark brown, with an oblique white band near the middle, and some shorter ones towards the base; an outer oblique band meets the middle of a white stripe, irregular below, just within the outer margin of the wing, and this is connected with another white line bordering the fore wings below. The hind wings are red, with some large black spots. The larva is brown, with yellow lines on the back and sides, and feeds on a variety of low plants, and also on broom, vine, etc. For this reason the moth is often met with in or near vineyards.

The Wood Tiger-moth (*Nemeophila Plantaginis*, Linnæus; Plate X., Fig. 4) is one of the smaller species. It is widely distributed throughout Europe and the British Islands, and is moderately common in woods. It is not a variable insect in Britain, but on the Continent its colours alternate between white, yellow and red.

The commonest and best known of all these moths is the Tiger-moth *par excellence* (*Arctia Caja*, Linnæus; Plate X., Fig. 6). Its shaggy caterpillar (Plate X., Fig. 6*a*) may be found in almost every garden, feeding on lettuce and a great variety of other plants, cultivated and uncultivated. It appears to be common throughout the whole northern hemisphere.

The Cream-spot Tiger-moth (*Arctia Villica*, Linnæus; Plate X., Fig. 7) is a much more local insect than the last, but is nevertheless sufficiently abundant in many localities in the south of England.

In Germany the Cream-spot Tiger is most abundant in the north-eastern plains, preferring warm, sheltered localities and avoiding the mountains; it is, however, almost absent in north-western Germany, though it is met with in Holland and Belgium. In the sandy plains of north-eastern Germany it is accompanied by another very handsome species, the Hebe Tiger-moth (*Arctia Hebe*, Linnæus; Plate X., Fig. 9), which, however, is absent from Holland and Belgium as well as from England. A third species, the Spotted Tiger-moth (*Arctia Purpurea*, Linnæus; Plate X., Fig. 8), has a very similar distribution to the last, and is equally absent from Britain and the Netherlands. All three species are met with near Paris; but Paris is not only a very rich locality for insects, but seems to be the extreme limit of many species which, though they may be common to the east and north-east, are not found at all due north or north-west of Paris.

The Ruby Tiger-moth (*Phragmatobia Fuliginosa*, Linnæus; Plate X., Fig. 10) is a pretty little moth, which is tolerably common in open places in woods. Although not exactly a day-flying moth, it is not unusual to find it at rest on the heads of thistles or other attractive flowers in the daytime. The larva is grey or black, and feeds on low plants.

The White and Buff Ermine moths (*Spilosoma Menthastri*, W. V.,

PLATE XI.—MOTHS.

FIG. PAGE

1.—Goat Moth (*Cossus Ligniperda*) 64

1*a*.—Ditto (Larva)

1*b*.—Ditto (Pupa)

2.—Wood Leopard Moth (*Zeuzera Æsculi*) 64

3.—Large Case Moth (*Psyche Unicolor*) 66

3*a*.—Ditto (Larva)

4.—Vapourer Moth (Male) (*Orgyia Antiqua*) 61

4*a*.—Ditto (Female)

4*b*.—Ditto (Larva)

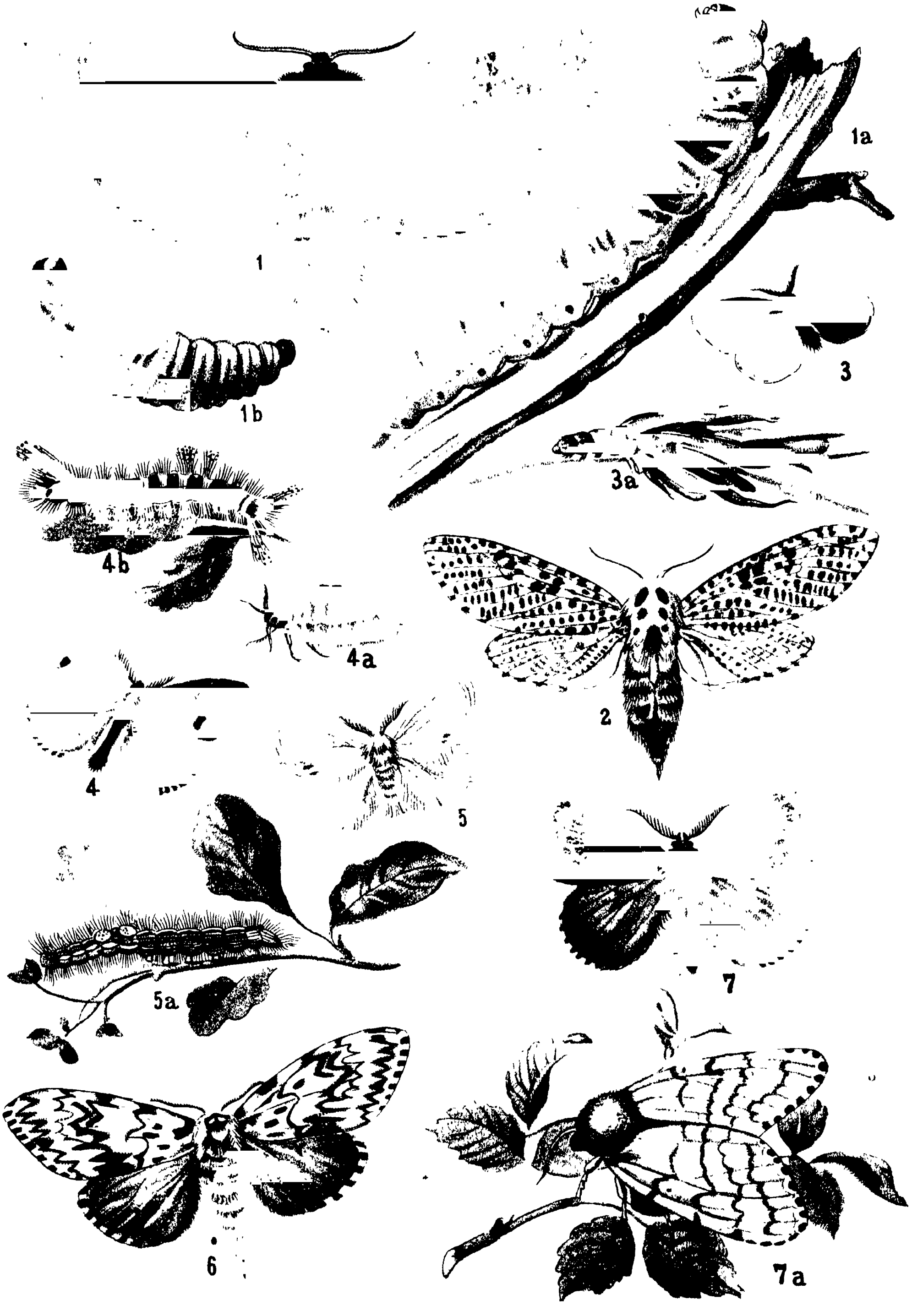
5.—Gold-tail Moth (*Porthesia Auriflua*) 63

5*a*.—Ditto (Larva)

6.—Black Arches (*Ocneria Monacha*) 63

7.—Gipsy Moth (Male) (*Ocneria Dispar*) 62

7*a*.—Ditto (Female)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dull-coloured caterpillars produce brightly coloured butterflies or moths, and that brightly coloured caterpillars produce dull-coloured butterflies or moths. However, this is far from being an invariable rule; but it is quite safe to say that the respective colours and markings of caterpillars on the one hand, and of butterflies and moths on the other, never exhibit the slightest resemblance to each other, except in the very rarest instances.

The Gipsy moth (*Ocneria Dispar*, Linnæus) was formerly common in the fens of the eastern counties, where it is now extinct. It is fortunate that it has never succeeded in extending its range in England, even when introduced. On the Continent it is very injurious to trees, and is quite as common as the Vapourer moth with us. The habits of the male (Plate XI., Fig. 7) are very similar. The female (Plate XI., Fig. 7*a*) is a stout-bodied, sluggish moth, utterly unlike the male, even in colour. It is to be found during the day resting on hedges and tree-trunks, where its light colour easily attracts attention. Twenty years ago an American entomologist, living a few miles from Boston, imported a supply of eggs of this insect to rear, and some of them were blown out of the open window. Some years afterwards the caterpillars, previously unknown in America, appeared in immense numbers, and began to strip all the trees in the neighbourhood of their leaves. Since then the State of Massachusetts has been spending thousands of dollars annually in the vain attempt to exterminate them; or, failing this, to diminish their ravages, and check their further extension. It must, however, be added that the climate of North America is much more favourable to the rapid multiplication of insect life than our own, and that the destruction caused by insects is generally far greater and more serious in that country than in Europe.

The Black Arches (*Ocneria Monacha*, Linnæus; Plate XI., Fig. 6) is another insect which is extremely destructive to trees on the Continent, but which, though common in many parts of England, is seldom or never sufficiently abundant to do much serious injury in this country. The female is furnished with a short ovipositor, an instrument for depositing her eggs in the chinks of bark. This is an unusual character in butterflies and moths, though it may also be observed in the Wood Leopard moth, figured on the same plate (Fig. 2), and in a few other species.

There are several moths belonging to this family which are of a satiny-white colour. One of the commonest and most destructive of these is the Gold-tail moth (*Porthesia Auriflua*, W. V.; Plate XI., Fig. 5), so called from the tuft of gold-coloured down at the extremity of the body, which the female uses to cover her egg-clusters with. The larvæ (Plate XI., Fig. *5a*), and in the evening the moths, are very common on hedges, which they often defoliate, frequently with the assistance of a slightly larger species, the Brown-tail moth (*Porthesia Chrysorrhœa*, Linnæus), in which the apical tuft is more brown than golden, but which is a more local insect in England than the Gold-tail moth.

The White Satin moth (*Leucoma Salicis*, Linnæus) measures about two inches in expanse. The wings are pure white, and unspotted, but the antennæ and legs are black, the latter ringed with white towards the extremity. The larva is black, with white spots on the back, and feeds on poplars and willows. The moth is not uncommon, and may often be seen during the day resting on the trunks of trees. The wings are longer in proportion than in the Brown-tail and Gold-tail moths, and the abdomen is white.

THE GOAT MOTH, THE GHOST MOTH, THE CASE MOTH, AND THEIR ALLIES.

The Goat moth (*Cossus Ligniperda*, Fabricius; Plate XI., Fig. 1) is a very large stout-bodied moth, which is too common in England, but yet is seldom noticed by anybody in any of its stages. It is an internal feeder, and its great foul-smelling, flesh-coloured caterpillar (Plate XI., Fig. 1*a*) spends three years burrowing in the wood of willows and other trees before it arrives at maturity and turns into a pupa (Plate XI., Fig. 1*b*) from which the moth emerges. The larva may sometimes be seen creeping on the ground near the root of the tree on which it has fed; but perhaps only in the case of a specimen which has been stung by ichneumons, for it usually forms its pupa in a cocoon in its gallery.

An allied species, the Wood Leopard moth (*Zeuzera Æsculi*, Linnæus; Plate XI., Fig. 2), is much less common in England, but is even more injurious, as its yellow, black-spotted larva seems to prefer fruit trees to forest trees to burrow in, and the insect is consequently more frequently met with in gardens and orchards than in woods.

The Ghost moth (*Hepialus Humuli*, Linnæus; Plate X., Fig. 12)

PLATE XII.—MOTHS.

FIG.	PAGE
1.—December Moth (*Clisiocampa Populi*)	71
2.—Lackey Moth (*Clisiocampa Neustria*)	71
3.—Oak Eggar (Male) (*Lasiocampa Quercus*)	70
3*a*.—Ditto (Female)	
4.—Drinker Moth (*Lasiocampa Potatoria*)	70
5.—Lappet Moth (*Gastropacha Quercifolia*)	69
5*a*.—Ditto (Larva)	
6.—Kentish Glory (*Endromis Versicolora*)	67

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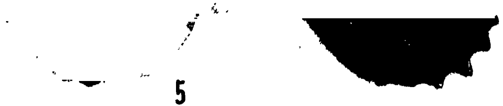
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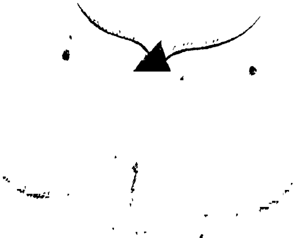
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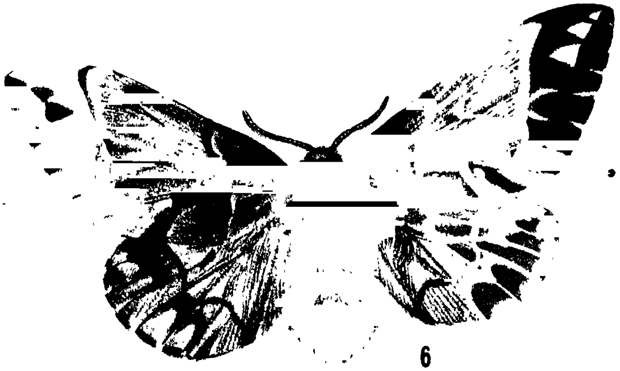
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is the largest British representative of the family *Hepialidæ*, and is very common all over the country in meadows in the evening. Except in the Shetland Islands, where the markings of the sexes are variable, and more or less interchangeable, the females generally resemble our figure, while the males are of a uniform white above, with narrow borders, and the underside uniform brown. The moth has probably derived its name from the fact that it often attracts attention in country churchyards on summer evenings.

The other moths of this family are called Swifts by collectors. Most of them are much smaller than the Ghost moth, but have wings of the same peculiar narrow form; they are brown, or reddish-brown, with oblique white or yellow streaks or rows of spots on the fore wings.

The Case moths belong to a family called *Psychidæ*, which includes a number of small moths with broad wings, generally of a uniform smoky brown, blackish, or whitish colour. They used to be called by entomologists at a time when English names were in more general use than at present, "Chimney-sweeper's Boys." They fly slowly in the daytime, something like the Burnet moths, but more weakly, near the level of the long grass in meadows. This applies only to the males, for the females are wingless, and in some instances are destitute of antennæ and legs as well, never leaving their cases, in which they deposit their eggs. The larvæ of these curious moths construct cases for themselves, very similar to those of caddis worms, from bits of grass, etc. These cases may often be found adhering to grass or stones in places where the moths are common. We have several small species in England which are very similar and difficult to determine, but the Large Case moth (*Psyche Unicolor*, Hufnagel), figured on Plate XI., Fig. 3, along with its larva and case (Fig. 3*a*), which is considerably larger than any of our British species, is not found in the British Islands, nor in the neighbouring north-western districts, though it is common in other parts of the Continent.

It is a pity that the name Psyche, which in Greek denotes a goddess, the spouse of Eros, or Cupid; Life; the Soul; and a Butterfly, should have been applied in entomology to a genus of moths to which it seems to be particularly inappropriate in any or all its meanings. Many names used in entomology have no particular application, and others no meaning at all, but it is unfortunate when they have a definite meaning that they should not be applied accordingly.

THE HOOK-TIPS, KENTISH GLORY, AND EMPEROR MOTHS.

The Hook-tips belong to a small family called *Drepanulidæ*. They have broad wings and moderately slender bodies, and before their larvæ were known, they used to be classified with the Loopers.

The Chinese Character (*Cilix Glaucata*, Scopoli; Plate XIII., Fig. 4) is a curious little moth which has no very near ally. It is common in many places, and hides itself in bushes and hedge-rows during the day, from which, however, it is easily disturbed.

The Pebble Hook-tip (*Platypteryx Falcataria*, Linnæus; Plate XIII., Fig. 3) is also a fairly common insect in England, as well as on the Continent.

The Kentish Glory (*Endromis Versicolora*, Linnæus; Plate XII., Fig. 6) is a large and handsome moth which is common in large forests in England and Scotland, where birch is plentiful. The larva chiefly feeds on this tree, though it has also been found on alder, lime, etc. The larva is green, with white oblique stripes, and an obtuse prominence before the extremity. The sexes of the moth differ considerably. We have figured the female; the male is smaller, with more numerous white markings than in the female, and the hind wings are yellow. The male flies rapidly by day, but the female is more sluggish. These differences are not unlike those which distinguish the sexes of the Emperor moth; though the Kentish Glory is not really allied to the Emperor, but to the Chinese Mulberry Silkworm (*Bombyx Mori*, Linnæus), the type of the small family *Bombycidæ.* The silkworm and its moth are so frequently reared in England, and have been so often represented in books of natural history, that it is hardly necessary to describe it here. It may easily be obtained, in all its stages, at Covent Garden, or from most dealers in objects of natural history.

Much of the silk used in India, China and Japan is produced by large moths belonging to the family *Saturniidæ*, of which our only British representative is the Emperor moth (*Saturnia Carpini*, W. V.; Plate XIII., Fig. 1, male; Fig. 1*a*, female; Fig. 1*b*, larva). The moth is common throughout the British Islands on heaths and in bushy places, where the larva feeds on a variety of shrubs, though it seems to prefer heath. There are two other European species allied to this which we may mention. One, the Austrian Emperor moth (*Saturnia Spini*, W. V.), is found in South-eastern Europe. It is very similar in the colouring of both sexes to the female of our own species. The other species, the Great Peacock moth (*Saturnia Pyri*, W. V.), which inhabits Southern and South-central Europe northwards to Paris and Vienna, is the largest moth found in Europe. It is dark brown, and the wings expand six inches at least.

One or two other *Saturniidæ* are found in Europe, but the family is poorly represented in this part of the world, being mainly a tropical group. One species, however, besides those which we have already mentioned, is common throughout the greater part of Europe, though it does not extend to Britain. This is the Tau Emperor (*Aglia Tau*, Linnæus; Plate XIII., Fig. 2), which derives its name from the small white mark in the centre of the eye-spot, which frequently resembles a T in shape. The larva feeds on various trees, but the insect is most plentiful in beech forests, beech appearing to be its favourite food. The male, like that of the Kentish Glory and the Oak Eggar, flies rapidly through the woods in spring and early summer, but the female, which is of a paler colour than the male, is generally found resting on the trunks of trees, or among dead leaves.

THE EGGARS AND THEIR ALLIES.

These are included in the family *Lasiocampidæ*, to which belong a variety of stout-bodied moths, generally of dark colours, which are almost destitute of the eye-spots on the wings which form such a striking feature in the Emperor moths, though it is represented in several species by a small round spot in the centre of each wing. All the species which we have figured are common in the British Islands as well as on the Continent, though there are several other species in our own country, besides others which are met with on the Continent, but which do not reach our islands.

The largest of the British species is the Lappet moth (*Gastropacha Quercifolia*, Linnæus; Plate XII., Fig. 5). It is remarkable for its strongly dentated wings and for its long, beak-like palpi. When at rest, its fore wings are laid back so far that the front part of the hind wings projects beyond them, and from this it derives its name. In this position the moth has a great resemblance to a dead leaf, as may be seen by the remarks of an entomologist who was the first to rediscover another species, the Small Lappet (*Gastropacha Ilicifolia*, Linnæus), which is rare in Scotland and the north of England, and which had been struck out of our lists because no specimens had been taken in Britain for many years. He says: "It was clinging to a dead sprig of heather, apparently but lately emerged from the pupa. From its great resemblance to a withered leaf it would not probably have caught my eye had I not luckily knelt down within a few inches of it to pin a small *Tortrix*." The handsome larva of the Lappet moth, which feeds on a variety of trees, is figured at Plate XII., Fig. 5*a*. The Small Lappet has dentated wings like the larger species, but is of a rusty grey, with a square white spot in the middle of the fore wings. It appears to be almost as scarce and local on the Continent as it is in Britain.

The Drinker moth (*Lasiocampa Potatoria*, Linnæus; Plate XII., Fig. 4) is common everywhere, though its larva, which feeds on grass, and is not difficult to rear, is much more frequently met with than the moth. The larva is bluish-grey, with longitudinal white lines broken into spots, and long dark tufts of hair on the back near the head and tail. It is easiest to find on a dewy morning, or after a slight shower. The sexes of the Drinker moth differ in the same manner as those of the Oak Eggar; and the female is of the same colour as in our figure of that of the latter (Plate XII., Fig. 3*a*), which it somewhat resembles, except in shape and markings, in which it resembles the male Drinker.

The Oak Eggar (*Lasiocampa Quercus*, Linnæus) is very common in woods and on heaths, where the larva feeds on oak and other trees and shrubs. The difference in colour of the sexes is very considerable, and may be seen in our figures (Plate XII., Figs. 3, 3*a*). The figure of the female, however, represents an unusually pale variety; it has generally a curvèd white line across the wings, edged inside by a dark line on the fore wings. The male flies wildly by day with greater rapidity than any other

British moth; but if a freshly emerged female is carried near their haunts, the males will flock to the spot from the distance of a mile or more, and can be readily captured, as they are then quite fearless and regardless of danger. The insect derives its English name from the oak, on which the larva frequently feeds, and from the large egg-shaped cocoon of tough silk in which the pupa is enclosed.

The December moth (*Clisiocampa Populi*, Linnæus; Plate XII., Fig. 1) is one of the smaller members of the family to which it belongs. We always expect butterflies and moths to appear in summer, but there are many exceptions to this rule in various families of moths, and the grey, red-spotted and yellow-lined larva of this species is hatched from the egg in spring, and is full-grown at the end of May or June. It feeds on oak, poplar, beech, lime, and hawthorn, and hides itself in the chinks of the bark. Cold weather seems to suit the moth, for while it does not generally appear in England till November or December, on the Continent, where the winters are longer and more severe, it often appears much earlier. It is not easy to obtain, unless it is reared either from the larva or from the cocoons, which are usually found attached to the trunks of the trees on which the larvæ have fed.

The Lackey moth (*Clisiocampa Neustria*, Linnæus; Plate XII., Fig. 2) is the commonest and most destructive insect of this family found in England. It varies considerably both in size and colour, but the two brown lines shown in our figure remain fairly constant. It varies in colour as much as the sexes of the Oak Eggar, but these variations do not depend on sex, as in the latter species. The female lays her eggs in a ring, closely cemented together, round the twig of a tree. The insect derives its name from the beautiful colours of the larvæ, which have a white line on the back, and stripes and spots of black, red, orange, and blue on the sides. The larvæ feed on all kinds of fruit and forest trees (apple, mountain ash, oak, poplar, etc.), and construct a silken network, to which they retire for rest and shelter, and from whence they wander all over the tree on which they live in search of food.

THE PUSS MOTHS AND PROMINENTS.

These moths form the family of the *Notodontidæ*, which comprises a number of moths found in Europe, many of which are British, but which, with few exceptions, are not generally abundant. Many species are remarkable for possessing a conspicuous tooth in the middle of the hinder edge of the fore wings; and this has led to their being called Prominents. Others are remarkable for the peculiar shape of the larvæ. We have only figured a few of the commoner and more interesting species.

Some of the most interesting of this family, and also the most objectionable, are not British. We allude to the Processionary moths, the commonest species of which, *Cnethocampa Processionea* (Linnæus), is local in France and Germany, and the larvæ are

PLATE XIII.—MOTHS.

FIG. PAGE

1.—Emperor Moth (Male) (*Saturnia Carpini*) 67

1*a*.—Ditto (Female)

1*b*.—Ditto (Larva)

2.—Tau Emperor (*Aglia Tau*) 68

3.—Pebble Hook-Tip (*Platypteryx Falcataria*) 67

4.—Chinese Character (*Cilix Glaucata*) 66

5.—Puss Moth (*Cerura Vinula*) 74

5*a*.—Ditto (Larva)

6.—Pebble Prominent (*Notodonta Ziczac*) 75

7.—Buff Tip (*Phalera Bucephala*) 73

8.—Peach Blossom Moth (*Thyatira Batis*) 76

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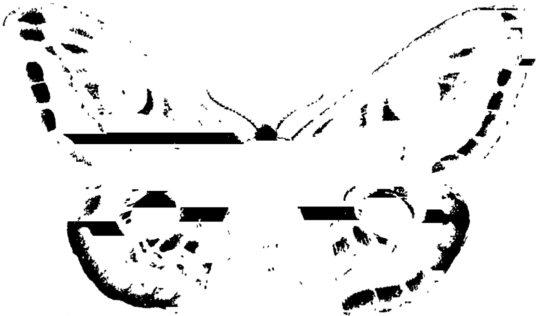
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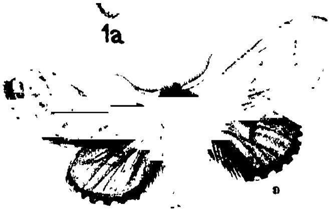
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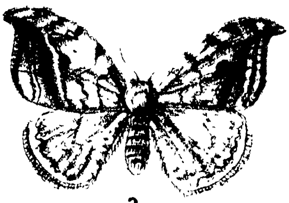
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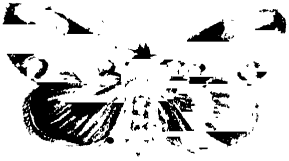
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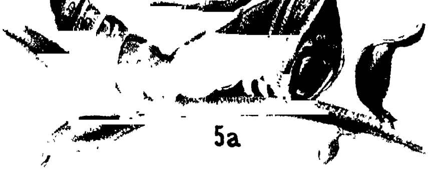
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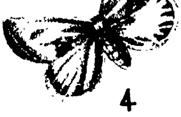
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often very destructive to oaks, though the moth, for some reason or other, is seldom seen. The moth is yellowish-grey, with three darker lines and a central lunule, or crescent-shaped spot, on the fore wings. The hind wings are paler, with an indistinct, dark, transverse band. The moth measures about an inch in expanse of wing. The larva is bluish-black, with the sides whitish, and two yellowish warts on each segment. The larvæ live under a web on the trunks of oak trees, and sally forth to feed at night in a regular procession, whence their name. Hairy caterpillars are often dangerous to handle, on account of the irritation which their hairs are liable to produce; but that caused by the hairs of the Processionary caterpillars is worse than that produced by any other European larvæ, and is said to have actually caused death in some cases.

The commonest and most destructive of the British moths of the family *Notodontidæ* is the Buff-tip (*Phalera Bucephala*, Linnæus; Plate XIII., Fig. 7), which is not very closely related to any other British species. The moths when at rest wrap their wings round their bodies in such a way as to give themselves a great resemblance to bits of dry moss-covered stick. Like most tree-feeding caterpillars, those of the Buff-tip, which are alternately striped with black and yellow, are not particular about their food, but seem to be especially destructive to elm and lime. They are gregarious, and frequently strip whole trees of their leaves; and if they fall from the tree on which they are feeding, they will crawl back to the trunk, for they are very active, and climb up again. The moths are often found resting, singly or in pairs, on the trunks of trees, but are very easily overlooked, unless specially searched for.

The Puss moth (*Cerura Vinula*, Linnæus; Plate XIII., Fig. 5) derives its name from the grey, furry appearance of the insect, and is a handsome and conspicuous moth, but its larva, which is common on poplars and willows, is much more remarkable on account of its peculiar shape, the claspers, or pair of legs at the extremity of the body, being modified into two hollow appendages containing slender, rose-coloured filaments, or "whips," which are projected from the outer cases when the larva is alarmed, and are used to drive away ichneumon flies, and other enemies. The singular pattern on the back is also noteworthy. There are several smaller and generally much rarer moths otherwise considerably resembling the Puss moth, which are met with both in Britain and on the Continent. They are generally called "Kittens" by English entomologists. There is another species of this family which is remarkable on account of the strange appearance of the larva. This is the Lobster moth (*Stauropus Fagi*, Linnæus), which is widely distributed in England and Central Europe, but is always scarce. It is a dark-brown moth, about 2½ inches in expanse, with an irregular pale line across the fore wings, and some black spots before the outer border. The larva, which feeds on beech and other trees, is reddish-brown, and stands on its prolegs, with the head and tail raised. The second and third legs are very long, and the claspers are replaced by two processes, shorter than those in the Puss moth, and not containing whips.

None of the preceding species possess a tooth on the hinder edge of the fore wing, but this is very noticeable in the Pebble Prominent (*Notodonta Ziczac*, Linnæus, Plate XIII., Fig. 6), which is the next species we have to consider. The larva feeds on willows and sallows, and sometimes on oak. It is of a reddish-brown colour, and has two curious humps on the back. It has been suggested that the name *Ziczac* relates to the extraordinary appearance of the humped larva when resting with its head and tail raised, which seems not unlikely. One of the prettiest species of this family is the White Prominent (*Microdonta Bicolora*, W. V.). It measures about an inch and a half across the wings, which are white, with some orange spots, partly bordered with black, on the fore wings. It is a rather scarce moth in Central Europe, not extending very far north or south; but it has been met with occasionally in England and Ireland. The larva is green, with fine dark lines on the back, and a yellow stripe on the sides. It feeds on birch.

THE OWL MOTHS, OR NIGHT-FLYING MOTHS.

Under this heading, are comprised a large number of moths which are generally of moderate size and stoutness, and most of which are of dull colours. The greater number of these fly at dusk or at night, hovering over flowers in the evening, and coming into rooms through the open windows when candles are lighted. Some species, however, are comparatively large and brightly coloured, and several of them are day-flying insects, like butterflies. Entomologists frequently paint a sweet mixture on trees (coarse sugar boiled down in beer, and flavoured with a few drops of rum, is generally used for the purpose), and go round after dark with a lantern, when they find the moths in company with a variety of other insects resting on the trees, when they can easily be captured. Among the flowers which are most attractive to insects may be mentioned clover in the day-time, and at dusk sallow and ivy-blossom, for early spring and late autumn moths, respectively; catchfly, valerian, heliotrope, honeysuckle, petunia, etc. Lilac, lime-tree, etc., are also very attractive, when in bloom.

There are about 300 different kinds of moths of this section found in England, of which we shall notice a fairly representative selection.

Our series of illustrations of these moths begins with a very handsome species, the Peach-blossom moth (*Thyatira Batis*, Linnæus; Plate XIII., Fig. 8), which derives its name from its delicate colouring. It is a common and widely distributed insect in the British Islands, though not excessively abundant. It is said to be more common in the north of France than in the south. The larva feeds on bramble.

The Figure-of-8 moth (*Diloba Cœruleocephală*, Linnæus; Plate XIV., Fig. 1) is classed by some entomologists among the Prominents. It is very common, and the larva, which feeds on

PLATE XIV.—MOTHS.

FIG. PAGE

1.—Figure-of-8-Moth (*Diloba Cæruleocephala*) 76

1*a*.—Ditto (Larva)

2.—Map Moth (*Clidia Geographica*) 77

3.—Miller (*Acronycta Leporina*) 77

4.—Sycamore Moth (*Acronycta Aceris*) 77

5.—Scarce Marvel-du-Jour (*Moma Orion*) 78

6.—Harlequin Moth (*Diphthera Ludifica*) 77

7.—Broad-bordered Yellow Underwing (*Triphæna Fimbria*) ... 81

8.—Common Yellow Underwing (*Triphæna Pronuba*) 81

8*a*.—Ditto (Larva)

9.—Flame Shoulder (*Agrotis Plecta*) 82

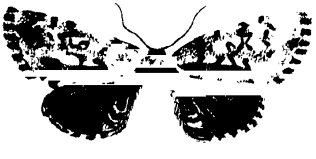
10.—Heart-and-Dart Moth (*Agrotis Exclamationis*) 82

11. —Dot (*Mamestra Persicariæ*) 85

12.—Scarce Coronet (*Dianthœcia Compta*) 83

13.—Marvel-du-Jour (*Dichonia Aprilina*) 83

Plate XI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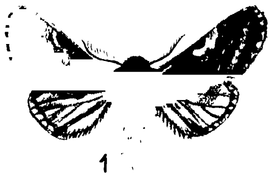
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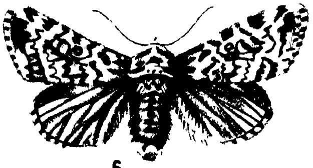
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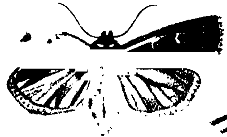
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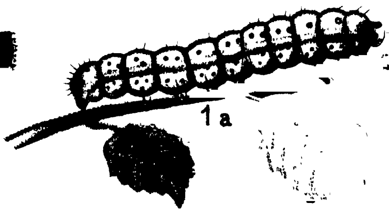
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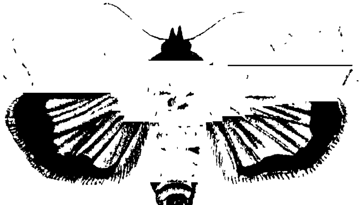
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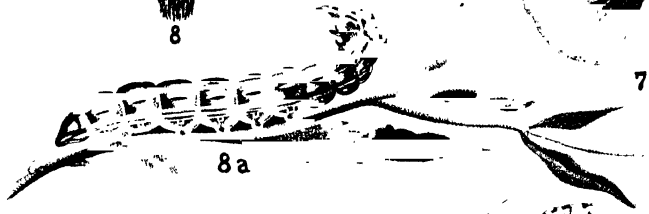
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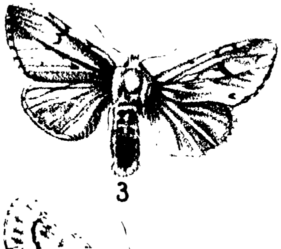
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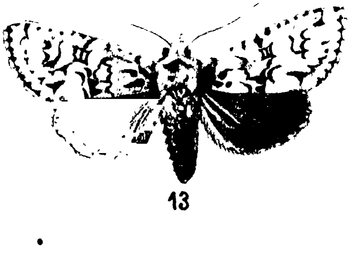
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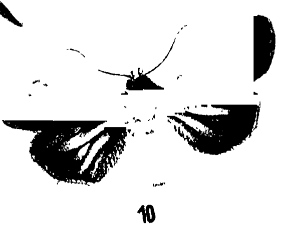
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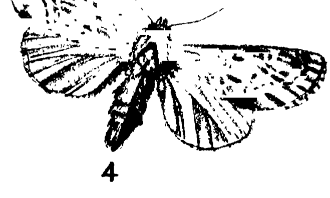
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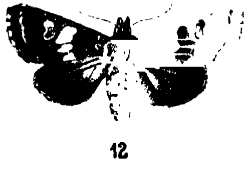
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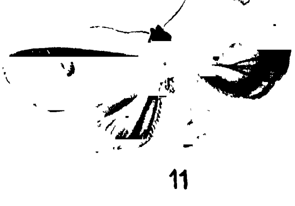
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figured on the same plate (Fig. 13), which will be duly noticed in its place. The former species, though somewhat scarce in England, is common and widely distributed on the Continent, where, however, it is a little uncertain in appearance, being commoner some years than others. The larva, which is black with yellow spots on the back, feeds on oak, and the moth is often found sitting on the trunks of trees.

The Harlequin moth (*Diphthera Ludifica*, Linnæus, Plate XIV., Fig. 6) is not found in Britain, nor in the neighbouring parts of north-western Europe. In Central Europe it is widely distributed, but is very local and rarely common. The larva is bluish-grey with yellow longitudinal lines, and feeds on the Service Tree (*Sorbus Ancuparia*) as well as on oak and willow.

There are a considerable number of reddish or yellowish-white moths, very simply marked, which are called Wainscots. Many of them are marsh-frequenting insects, and are now scarce in England, but a few are common everywhere. One of these, the Common Wainscot (*Leucania Pallens*, Linnæus), has pale-ochreous, or more rarely, reddish-ochreous fore wings, with whitish longitudinal nervures, and three not very distinct black dots; the hind wings are whitish. The yellowish or reddish larva feeds on grass, and various low plants.

The Pine Beauty (*Panolis Piniperda*, Panzer ; Plate XV., Fig. 7) is an insect which extends throughout Europe, and is especially characteristic of the great pine forests of Germany, where the larva, which is green, with white longitudinal lines on the back, and a red or yellow one on the sides, sometimes appears in devastating abundance, chiefly, however, in the north-east of the country. In England, Scotland, France and western Germany it is a fairly common insect, but not sufficiently so to do much real harm. The moth may be found resting on the trunks of the trees, or may be shaken from the branches. The larva feeds on fir as well as pine.

The Antler moth (*Charæas Graminis*, Linnæus) measures an inch and a quarter across the wings. It is brown, with a branching white mark in the middle of the fore wings, from which it derives its name; the hind wings are dark brown. Its brown larva feeds on the roots of grass, and is often very destructive.

The White-spotted Pinion (*Cosmia Diffinis*, Linnæus) is a very pretty moth, measuring an inch and a quarter across the wings. The fore wings are reddish, with two transverse white lines running from two large white spots on the front edge; the hind wings are brown. It is not an uncommon moth, and the pale green larva feeds on elm.

The Frosted Orange moth (*Gortyna Flavago*, W. V.; Plate XV., Fig. 5) is a commoner insect in England and the northern parts of Central Europe than in more southern districts. The white, black-speckled caterpillar lives inside the stems of thistles, burdock, etc., and the moth may sometimes be found by day in waste places, among rank herbage, or resting on flowers.

The Satellite (*Scopelosoma Satellitia*, Linnæus) is a larger moth than the last, measuring nearly two inches in expanse of wing.

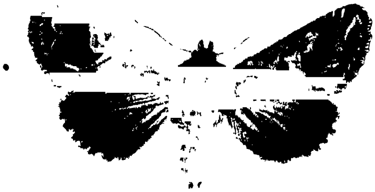
It has reddish brown fore wings, with a very conspicuous white or orange spot in the middle; the hind wings are brown. It is a very common species. The larva is black, with three short white lines behind the head, and with white spots on the sides. It lives on trees, but it has an evil reputation, for it does not confine itself to vegetable food, but will attack and devour any other larva which may come in its way.

The Herald moth (*Scoliopteryx Libatrix*, Linnæus; Plate XV., Fig. 8) is a very abundant species, remarkable for the curious shape of its wings, and the brick-red blotches on the variegated fore wings. It is to be found almost throughout the year, for it has a habit of hibernating in outhouses, caves, holes in walls, etc., where it is likely to be disturbed at any time. It is very common throughout the whole North Temperate Zone. The larva is green, with two yellow lines on the back, and feeds on poplars and willows, and the pupa is placed in a bunch of leaves at the end of a twig.

The Copper Underwing (*Amphipyra Pyramidea*, Linnæus; Plate XV., Fig. 6) is one of the British representatives of a small group of closely allied species which are found throughout Europe and Northern Asia, and are most numerous in Japan. Some of the species are smaller and darker than the others, and among them is a commoner moth (*Amphipyra Tragopogonis*, Linnæus) of which Stainton writes: "It is especially fond of creeping into houses and secreting itself in blinds, and when dislodged, if it falls on its belly or back, it shuffles along in a very peculiar

PLATE XV.—MOTHS.

FIG. PAGE
1.—Orache Moth (*Hadena Atriplicis*) 86
2.—Angle-shades (*Habryntis Meticulosa*) 87
3.—Old Lady (*Mania Maura*) 87
4.—Banded Green Moth (*Jaspidea Celsia*) 88
5.—Frosted Orange Moth (*Gortyna Flavago*) 79
6.—Copper Underwing (*Amphipyra Pyramidea*) 80
7.—Pine Beauty (*Panolis Piniperda*) ... ...
8.—Herald Moth (*Scoliopteryx Libatrix*) ... ...
9.—Red Sword-grass Moth (*Calocampa Vetusta*) ... ... [illegible]
9*a*.—Ditto (Larva)
10.—Mullein Moth (*Cucullia Verbasci*) 89
10*a*.—Ditto (Larva)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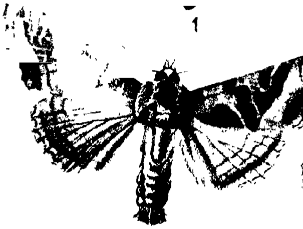
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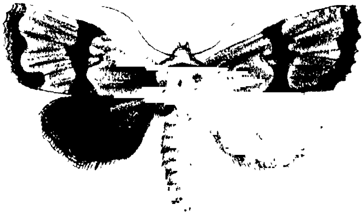
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manner, whence, no doubt, it has attained the name of 'The Mouse.'"

Many of the Owl moths have dull-coloured fore wings, and brightly coloured hind wings, which are hidden beneath the former when the insect is at rest. Among these are the Yellow Underwings, several species of which are very common. They fly at dusk or at night, but like to conceal themselves in weedy places, and are easily disturbed, when they fly away, looking very conspicuous as they unfold their large yellow hind wings. Their flight is strong, but not sustained, for they drop suddenly to the ground to seek a new hiding-place, fold their bright coloured wings out of sight, and become dingy and inconspicuous as before.

One abundant species is known as the Common Yellow Underwing (*Triphæna Pronuba*, Linnæus; Plate XIV., Fig. 8). Its larva, figured at Fig. 8*a*, feeds on primroses and other low plants, but another species, called the Lesser Yellow Underwing (*T. Comes*, Hübner), is nearly as common. It is rather smaller than the former, and is marked with a black spot in the middle of each of the hind wings. Four other species inhabit Europe, all of which extend to the British Islands, the most conspicuous of which is the Broad-bordered Yellow Underwing (*Triphæna Fimbria*, Linnæus), figured at Plate XIV., Fig. 7.

A large series of moths, allied to the Yellow Underwings, but smaller and with grey or white hind wings, often with a strong pearly lustre, is included in a genus called *Agrotis* by

Hübner. Many of them are very similar in appearance, and they fly in the evening and at night, and may be found hovering over flowers at dusk, or they may be attracted by light or sugar. In the daytime they are sometimes found sitting on the trunks of trees, or hiding in outhouses, etc. The larvæ are smooth and rather stout, and are generally of dull colours. They feed on low plants, and are not particular about their food. Many of them live close to or below the surface of the ground, and are sometimes very destructive to the roots of cultivated plants. The pupa is nearly always subterranean.

These may be considered the most typical representatives of the whole division of the Owl moths. We have figured two examples. One of these, the Flame Shoulder (*Agrotis Plecta*; Plate XIV., Fig. 9) is a smaller and handsomer moth than the majority of the allied species. It is no rarity; but the Heart-and-Dart Moth (*A. Exclamationis*, Linnæus; Plate XIV., Fig. 10) is one of the commonest of all. It derives its name from the markings on the fore wings. It is closely allied to another abundant species, the Common Dart (*Agrotis Segetum*, W. V.), in which the markings are less sharply defined, and often suffused. Their grey larvæ feed on the roots of grass and various low plants just below the surface of the ground, and are often very destructive in gardens, cornfields, and especially in turnip fields, not confining their attacks to the small roots, but eating their way in numbers into the turnips themselves.

The Green Arches (*Aplecta Herbida*, W. V.) is a rather large moth, measuring two inches in expanse. The fore wings are green varied with brown, and there is a zigzag white line before the outer margin; the hind wings are brown. It is not an uncommon moth. The larva is grey, with three pale lines on the back, between which are dark spots.

The Straw Underwing (*Cerigo Matura*, Hufnagel) is very similar to a Yellow Underwing, but the hind wings are of a much paler yellow, bordered with brown; the fore wings are brown. It is a common species. The yellowish larva feeds on grass.

The Marvel-du-Jour (*Dichonia Aprilina*, Linnæus; Plate XIV., Fig. 13) is remarkable for its resemblance to another moth figured on the same plate (Fig. 5) which we have already noticed. The former is common in many places throughout Great Britain and Ireland in late autumn, when it may be found sitting on the trunks of trees; in the north of Europe it is scarcer. Although it has received the name of "Aprilina," it is not generally met with in spring, at least in England and France, though it has occasionally been reared at that season. The larva is grey with brown markings, and feeds on oak in May, hiding itself during the day, when it is not very easy to discover. The pupa is not difficult to obtain by digging up the earth round the roots of the oak trees on which the caterpillars have fed.

The Scarce Coronet (*Dianthœcia Compta*, W. V.; Plate XIV., Fig. 12) has been figured as a representative of a small but very interesting genus called *Dianthœcia*, the larvæ of which live in the seed-pods of various species of campion and catch-fly. The moths may be easily captured at dusk, flying over the flowers of the same plants. The various species are very similar in habits and appearance, and are usually common where they are found, but they are not met with except where their food-plants are abundant. They are very local, and several species are entirely confined to restricted localities on the coast where the bladder campion grows, especially on the steep grassy slopes facing the sea on the Hill of Howth, near Dublin, and the steep sea cliffs near Douglas, in the Isle of Man. All the species, however—even those which are commoner and more widely distributed in Britain than the others—appear to be more frequently met with near the sea than inland. On the Continent this is not the case, and the moths are much more generally distributed than with us; but most of the species seem there to prefer hilly or mountainous districts to level country. The Scarce Coronet, as its name denotes, is a rarity in England and Ireland, as well as in the adjacent north-western parts of Europe; but it is generally common in France, and widely distributed, and is fairly common in Germany, especially in gardens, where the larvæ feed on the seed-pods of pinks and carnations. They are also found on various wild flowers.

In the third volume of the *Entomologist's Monthly Magazine* will be found an amusing account by the late Mr. Hopley of his experiences in collecting Clear-wings and Dianthœcias on the steep sea cliffs of the Isle of Man—apparently quite as exciting an experience as mountaineering. "This examination is often accomplished while clinging to the jagged shelves of these portentous rocks, holding on by a toe or two, one elbow or both, and a waistcoat, while the seething waters explode alarmingly in their caverns many hundred feet below; with, however, this small crumb of comfort to any accomplished diver, that the sea is said to be as many fathoms deep close to the rocks as it is in mid-channel. . . . These noble rocks have, nevertheless, much to be said in their favour. Chiefly of tenacious grey slate, each jag, however small, ensures a safe footing—or *toe*-ing would be the better word, for they would be but poor cragsmen who always expect an entire foot to stand between them and annihilation. . . . One evening I missed thirteen insects before taking a single example of the new *Noctua*, so very averse were they to come within reach, and so impossible was it to move a step one way or another, and save one's neck." The whole article is very amusing, but we must not further digress. The insects which Mr. Hopley was collecting were larvæ of the Thrift Clear-wing (*Sesia Muscæformis*, Vieweg), which is a small, white-belted species resembling the Currant Clear-wing, which we have already noticed at p. 51), and the Manx Beauty (*Dianthœcia Cæsia*, W. V.), a moth which is much darker and more uniform in colour than the Scarce Coronet, being bluish grey, varied with ochreous yellow.

The Dot (*Mamestra Persicariæ*, Linnæus; Plate XIV., Fig. 11) is a handsome moth with dark fore wings with a large and conspicuous white mark in the centre. It is common, but much less so than the closely allied Cabbage moth (*Mamestra Brassicæ*, Linnæus), which greatly resembles it; but the fore wings are brown, and the white mark on the fore wings, though well marked, is not nearly so white or conspicuous as in the Dot. The larva of the Cabbage moth is green or brown, and is exceedingly destructive, and much more injurious than those of the common white butterflies; for they only feed on the leaves from the outside, and are easily visible, while the larvæ of the Cabbage moth eat their way into the heart of the cabbage itself, where they can carry on their depredations unseen and unsuspected. Those of the Dot feed on low plants.

The Orache Moth (*Hadena Atriplicis*, Linnæus; Plate XV., Fig. 1) belongs to a genus of Owl moths closely allied to the Cabbage moth and the Dot. It is easily recognised by the elegant markings of the fore wings, and especially by the large pale spot in the middle. It is a very local species in the south of England, though frequently common where it is found, and the moth may be observed resting on walls and on the trunks of trees. On the Continent it is generally distributed, though it is more or less local, and is more frequently met with in fields and gardens than in the woods. The larva is greenish or reddish brown, varying considerably in colour in different individuals, and feeds on dock, goosefoot, and other low plants, as well as on orache (from which it derives its name), and, like the larvæ of many others of the more typical Owl moths, it hides itself under its food-plants during the day.

The Dark Arches (*Hadena Monoglypha*, Hufnagel) is one of the commonest Owl moths in gardens on summer evenings. It measures about two inches across the fore wings, which are greyish brown, varied with darker, and marked with a pale marginal line, angulated below so as to form a conspicuous **W**, a common character in many allied species. The hind wings are grey, a little iridescent towards the front edge. The larva is greyish brown, and feeds on the roots of grass, etc.

The Angle-shades moth (*Habryntis Meticulosa*, Linnæus; Plate XV., Fig. 2) is a very common and beautifully marked insect, which is met with throughout the fine season of the year. It is also quite unmistakable, for the British species which are most nearly related to it have very little actual resemblance to it. On the Continent, however, an allied insect, the Green Angle-shades (*H. Scita*, Hübner), an equally beautiful species, in which the pink markings of the fore wings are replaced with green, is not uncommon. The larvæ are green or brown, and that of the Angle-shades feeds on low plants. The larva of the Green Angle-shades also seems to vary in its food; violet, wild strawberry, fern and aspen are mentioned by different authors.

The Old Lady (*Mania Maura*, Linnæus; Plate XV., Fig. 3) is one of the largest of the dark-coloured Owl moths which fly about in gardens in the evening. It constantly flies in at the windows of country houses, even before candles are lighted, and I have sometimes seen several fluttering about the windows at the same time, trying to get out again. Notwithstanding its dark colours, its size and elegant markings make it a very conspicuous insect. The larva is grey, with whitish lines and dashes, and feeds on a variety of shrubs and low plants.

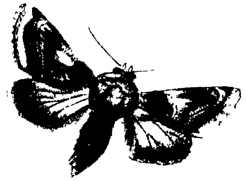
The Banded Green moth (*Jaspidea Celsia*, Linnæus; Plate XV., Fig. 4) is a very beautiful and conspicuous insect, but it is a very scarce species, which seems to be almost confined to the east of Europe; in Germany it is only found in the east and south-east, and though it is said to have been taken in Piedmont, it has not been noticed from any part of France. The records of its capture in Germany (on rushes, on thistles, and on the stump of a tree) seem to indicate that it is in the habit of resting in rather exposed situations in the daytime.

The Red Sword-grass moth (*Calocampa Vetusta*, Hübner; Plate XV., Fig. 9) belongs to a genus of which there are two common and very similar species in Europe (including the British Islands) and others in North America. The second European species, the Sword-grass moth (*C. Exoleta*, Linnæus) is paler-coloured than the other. The moths appear late in autumn, and hibernate, re-appearing as early in the year as March and April. The larvæ (*see* Fig. 9*a*) are green, with slender yellow and red longitudinal lines, and feed on various low plants, such as dock, scabious, thistle and rest-harrow. When at rest the moths fold their wings round their bodies, in which position they exactly resemble dry sticks. The larvæ were greatly admired by the late Mr. Stainton, who wrote quite enthusiastically on the subject. They exhibit another illustration of a fact to which we have already alluded:

PLATE XVI.—MOTHS.

FIG.	PAGE
1.—Gamma Moth (*Plusia Gamma*)	91
2.—Mottled Clover Moth (*Heliothis Dipsacea*)	90
3.—Pease-Blossom Moth (*Chariclea Delphinii*)	90
4.—Spotted Sulphur Moth (*Emmelia Trabealis*)	94
5.—False Burnet Moth (*Euclidia Glyphica*)	94
6.—Lunar Double-stripe (*Pseudophia Lunaris*)	94
7.—Clifden Nonpareil (*Catocala Fraxini*)	92
8.—Scarce Red Underwing (*Catocala Electa*)	93
9.—Bridesmaid (*Catocala Paranympha*)	93
10.—Orange Underwing (*Brephos Parthenias*)	96

Plate XVI.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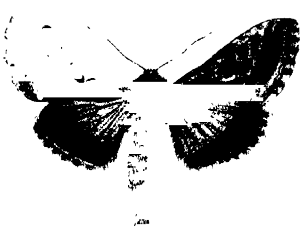
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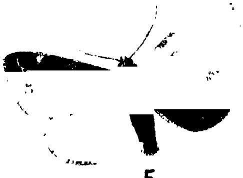
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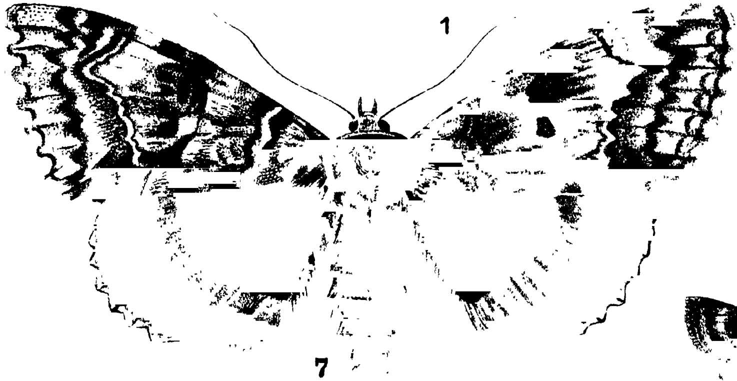
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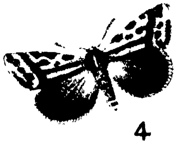
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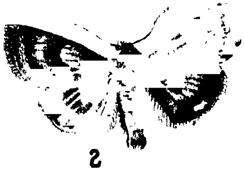
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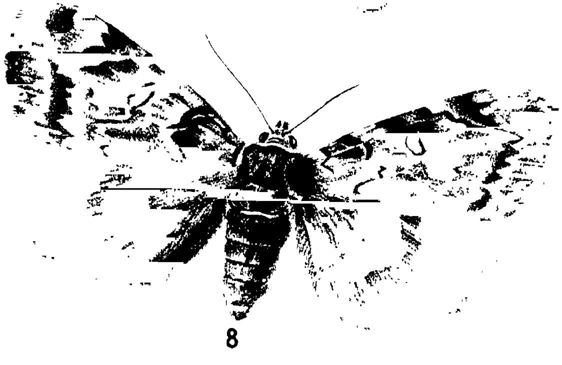
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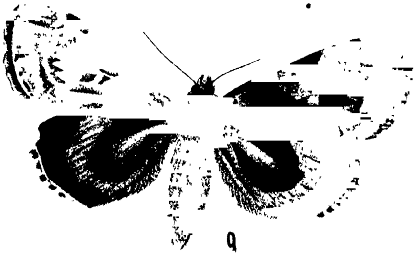
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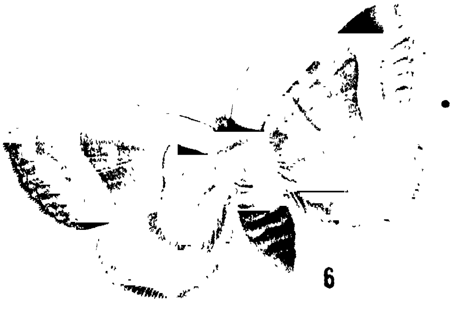
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that very beautiful larvæ frequently produce comparatively dull-coloured butterflies or moths, and *vice versâ*.

The Mullein moth (*Cucullia Verbasci*, Linnæus; Plate XV., Fig. 10) will serve as an illustration of a genus of moths generally known as "Sharks," for what reason I am not quite sure, unless the serrated borders of the wings have been supposed to have some resemblance to sharks' teeth. The different species are frequently so much alike that they can only be distinguished from each other with considerable difficulty, and the careful comparison of very slight characters; and all the species, when at rest, have much resemblance to bits of wood. The larvæ, however (Fig. 10*a*), are very conspicuous, and feed openly on their food-plants, and some species are sometimes met with in enormous numbers, while others are scarce, although their food may be abundant. These moths are, no doubt, less common in England than formerly, on account of their feeding on plants growing on waste land, such as mullein and camomile, which are liable to be rooted up and exterminated with the advance of cultivation. The moths are often found at rest on tree-trunks, palings, etc., but in such situations they are very difficult to see, from the assimilation of their own colour to that of the wood; but they are also to be met with flying over flowers in the evening.

The Green Silver Spangle (*Cucullia Argentea*, Hufnagel) is one of the most beautiful of the Sharks. It is widely distributed throughout Europe and Asia, but is a quite local insect in Germany, and does not appear to extend to France. It was regarded as a British species by some of the older English authors, but no doubt erroneously. The fore wings are green, and are adorned with large silvery spots; the hind wings are white. The green larva feeds on wormwood, which is a favourite food of several of the Sharks.

The Mottled Clover moth (*Heliothis Dipsacea*, Linnæus; Plate XVI., Fig. 2) is much more abundant on the Continent than in England, as it is somewhat local with us. It is a day-flying moth, and is found in clover fields along with bees, butterflies, Gamma moths, and other insects which visit the clover fields for the sake of their honey; it may also be found on thistles, etc. The larva is reddish, with pale lines, and feeds on toadflax, chicory, and other low plants. There are several other species of this genus, but most of them are rare in Britain, though some of them are common, and often very destructive throughout the warmer countries of both hemispheres.

The Pease-blossom moth (*Chariclea Delphinii*, Linnæus; Plate XVI., Fig. 3) is a very beautiful insect, but is one of the rarest of all the British species. A few specimens are said to have been found near Windsor about 1814 or 1815, but there is no record of the insect having been seen in this country since, and entomologists are beginning to omit it from our lists as either not truly indigenous, or extinct. On the Continent it is widely distributed, but it is local, and in many localities scarce, though it is common in gardens at Paris. The larva, which is bluish grey, with pale lines, feeds on larkspur, and, less frequently, on monkshood.

The Beautiful Yellow Underwing (*Anarta Myrtilli*, Linnæus) is common throughout the British Islands on heaths, where it flies rapidly in the sunshine. It is a small moth, not measuring more than an inch in expanse The fore wings are dull red, waved with olive green, with some slender waved lines, and a white spot near the middle; the hind wings are yellow, with a broad black border. The larva is green, with yellow spots on the back, and white spots on the sides; it feeds on heath.

The Gamma moth (*Plusia Gamma*, Linnæus; Plate XVI., Fig. 1), or the Silver Y moth, as it is sometimes called, derives its name from the conspicuous shining spot on the fore wings, which resembles the Greek letter γ in shape. Our figure represents a rather highly coloured specimen; the insect is generally browner. It is the commonest of all our day-flying moths, and is very active on the wing, flying over flowers in fields, woods and gardens both by day and at dusk. It is frequently seen in company with the Humming-bird Hawk-moth. It is equally common on the Continent, apparently quite irrespective of altitude. The green larva feeds on low plants, and is often destructive from its abundance. There are many other species of *Plusia* in Europe, several of which are more or less common in the British Islands. Some of these fly by day, while others only fly at dusk, or later. Some have metallic letter-like markings on the wings (white or bronzy) like the Gamma moth, while others are adorned with large masses of brassy green, or golden bronze, which occupy a considerable portion of the fore wings. There are also one or two species with yellow hind wings, which are not British, but which are met with on the Alps and in Lapland.

The Clifden Nonpareil (*Catocala Fraxini*, Linnæus; Plate XVI., Fig. 7) is the largest and most beautiful of the European Owl moths. It is very scarce in England, though widely distributed, and it is possible that the specimens which are taken singly at intervals in different parts of the country are casual visitors from the Continent. It is, however, an insect which may be found in any locality, though nobody is likely to find it anywhere except by accident. It has sometimes been seen even in the London parks. On the Continent it is not rare, though it seems to be commoner in France than in Germany. The moth is sometimes found resting by day on tree trunks, or under bridges. The grey larva feeds on poplar, and, less frequently, on willow. The front pair of prolegs is rudimentary.

The genus to which the Clifden Nonpareil belongs is called *Catocala*, from two Greek words, in allusion to the beautiful colours of the hind wings. There are many European species, but they are much more numerous in North America, and form several well-marked sections. One section is represented by the Clifden Nonpareil. It is represented in North America by a closely allied species, the Widow (*Catocala Relicta*, Walker), which is rather smaller, and has much lighter, greyish wings, and the pale band of the hind wings is grey instead of bluish. A great number of other species have the hind wings of some shade of red, varying from pale pink to deep crimson. Another large section contains species with yellow hind wings. The yellow species are numerous in Europe, Asia and America, but are not found in Britain. A fourth section is chiefly American, though it has a few representatives in Japan and the adjoining parts of Asia. In these species the hind wings are black; but, even then, the characteristic markings of the wings may generally be observed, outlined in black and grey, on the under surface.

The commonest British species of this genus is the Red Underwing (*Catocala Nupta*, Linnæus), which is in the habit of resting on walls and tree trunks in the daytime, and is easily disturbed. The larva feeds on poplar and willow, like that of the following species. The moth is very similar to the Scarce Red Underwing (*C. Electa*, Borkhausen; Plate XVI., Fig. 8), which has been taken once or twice in England, but is very rare. It is widely distributed in Europe, and generally common, but, like so many other moths and butterflies, becomes scarce towards the north-west. The two species are similarly marked, but the hind wings of the rarer species are of a much deeper colour. The word *Nupta*, which has been taken as the Latin name of the common species, means a bride, and most of the other species with red or yellow hind wings have received names more or less connected with marriage.

None of the species with yellow hind wings have yet been found in England; but we have figured the Bridesmaid (*Catocala Paranympha*, Linnæus; Plate XVI., Fig. 9), a species which is common in most parts of the Continent, except, as usual, in the north-west, where it is wholly absent. The larva feeds on sloe bushes.

The False Burnet (*Euclidia Glyphica*, Linnæus; Plate XVI., Fig. 5) is a very common day-flying moth which is found in meadows and clover fields in early summer. The larva, which is yellowish, feeds on trefoil and clover, and the moth is common throughout Europe and Northern Asia.

The Lunar Double Stripe (*Pseudophia Lunaris*, W. V.; Plate XVI., Fig. 6) is a common species in the south of Europe and North Africa, but it becomes scarcer towards the north of Europe, and in the south of England and Ireland it is a great rarity. It is, however, rather the outlying representative of an extensive group of moths belonging to the East Indian and African fauna than a typical European insect. The flight of the moth, when disturbed in the daytime, is rapid, but not sustained. The grey larva feeds on the oak, and its colour assimilates well with that of the bark of the tree.

The Spotted Sulphur moth (*Emmelia Trabealis*, Scopoli; Plate XVI., Fig. 4) is a scarce and local insect in the eastern counties of England, though it is widely distributed, and generally common on the Continent. This pretty little moth flies by day in open, weedy places, in clover fields, along the edges of cornfields, or among thistles. The larva is green or brown, with a yellow line on the sides; it feeds on the two common species of convolvulus or bindweed. The larva has only two pairs of prolegs, in addition to the claspers, instead of four pairs, which is the usual number in the Owl moths, though in some species, as in this, one or two of the usual pairs are undeveloped, thus resembling the Loopers.

The Fan-Foot (*Herminia Tarsipennalis*, Treitschke) has yellowish grey fore wings, crossed by three dark lines; the hind wings have a broken subterminal, pale, dark-edged line. There is a tuft of hair on the front legs of the male, and the antennæ are slightly thickened near the middle. The larva is blackish, and feeds on grass. Several species allied to this are common in England.

The Snout moth (*Hypena Proboscidalis*, Linnæus) is a brown moth with two oblique darker lines on the rather pointed fore wings, which measure about an inch and a half from tip to tip. The body is comparatively slender, and the rather long fore wings are laid back over the hind wings when at rest, forming a triangle, on which account this moth and the allied species are sometimes called Deltoids, from Delta, the Greek D, which is represented as a capital letter by a triangle, Δ. The moth may easily be recognised by its size and colour, and by the very long palpi, which form a snout in front of the head, as in the case of the Nettle-tree butterfly, which we have already mentioned at p. 35. This moth is always to be found abundantly among nettles, on which the velvety green larva feeds.

Here we may place a few species of rather doubtful position, the first three of which are green. The Green Silver Lines (*Halias Prasinana*, Linnæus) has green fore wings with three oblique whitish lines. The borders are reddish in the male and yellow in the female. The hind wings and abdomen are yellow in the male and white in the female. The moth measures about an inch and a half in expanse, and is a common species. The larva is yellowish green, with yellow lines and markings, and feeds on oak, etc.

The Scarce Green Silver Lines (*Chloephora Bicolorana*, Fuessly) is rather larger than the last species, and the fore wings are broader and less pointed; the fore wings are green, with two oblique lines, and the hind wings and abdomen are white. The larva is yellowish green, with yellow lines, and feeds on oak. It is a less common insect than the last, though widely distributed in the British Islands.

The Cream-bordered Green Pea moth (*Earias Chlorana*, Linnæus) is smaller than the foregoing species, being less than an inch in expanse. The white front border of the fore wings, and the white hind wings and abdomen, are very characteristic. It is not uncommon among willows, on the terminal shoots of which the larva feeds.

The Orange Underwing (*Brephos Parthenias*, Linnæus; Plate XVI., Fig. 10) belongs to a small and rather peculiar genus of moths, which includes three very similar European species only, two of which are British. The moth, which measures an inch and a half in expanse, has brown fore wings, slightly varied with yellowish grey, and the hind wings are orange, with the border, and part of the inner edge, blackish. The larva of the present species, which is common in many

PLATE XVII.—MOTHS.

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5.—	CLOUDED MAGPIE (*Abraxas Sylvata*)	101
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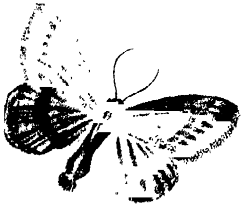
7.—	LILAC BEAUTY (*Pericallia Syringaria*)	98
8.—	SCALLOPED OAK MOTH (*Crocallis Elinguaria*)	99
9.—	ORANGE MOTH (*Angerona Prunaria*)	100
10.—	SWALLOW-TAIL MOTH (*Urapteryx Sambucaria*)	99
11.—	BRIMSTONE MOTH (*Rumia Luteolata*)	100
12.—	SPECKLED YELLOW (*Venilia Macularia*)	99

Plate XVII.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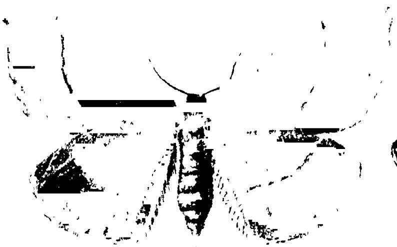
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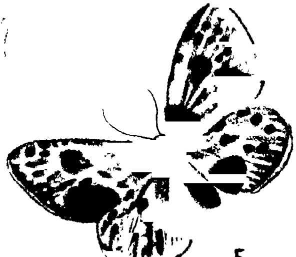
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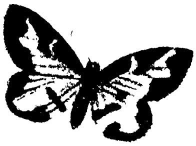
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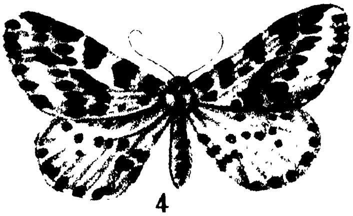
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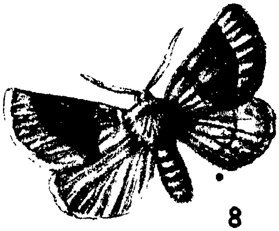
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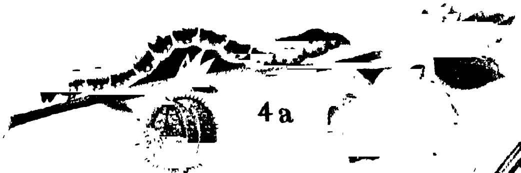
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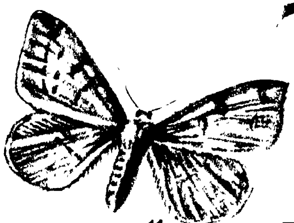
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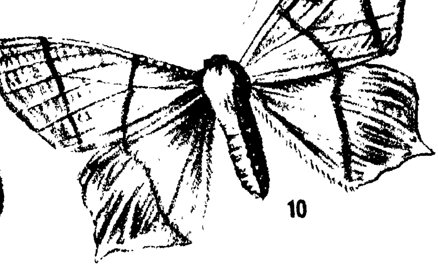
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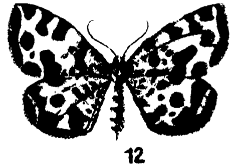
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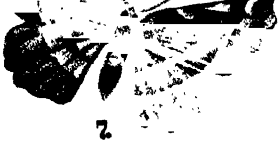
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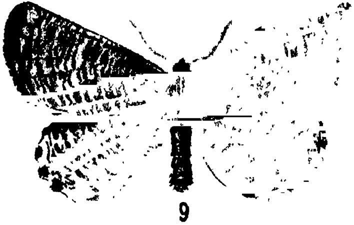
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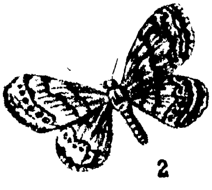
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parts of England and Scotland, is green, with some slender longitudinal black and yellow lines; and the three first pairs of prolegs are rudimentary. It feeds on birch, and sometimes (but more rarely) on oak and beech. When it is shaken off the tree on which it feeds, it drops down by a thread, a habit which is common among Looper larvæ, and those of the Bell moths, but which is unusual among the Owl moths. The moths appear in early spring (March and April), and have a rather swift and lofty flight among the birch trees in the sunshine; but they have a habit of settling frequently on paths, especially in damp places, and on the trunks of the birch trees.

THE LOOPERS, OR GEOMETERS.

The insects belonging to this section form a very homogeneous group, and are almost as numerous as the Owl moths. They are characterised by having the first three pairs of prolegs entirely absent; or very rarely the third, or the second and third pairs are present, but more or less rudimentary. A few species have stout and hairy bodies, and these are dark coloured; but most of the species have slender bodies, and broad wings adorned with bright colours. In this they resemble butterflies, and many of them hold their wings open, or raise them erect over their backs in a similar manner; but they can never be mistaken for butterflies, because their antennæ are either slender and tapering, or feathered; never in a single instance clubbed, or thickened at the extremity, like those of butterflies. A few species fly by day, but the greater number fly at dusk. However, like most of the small or slender-bodied moths, they are in the habit of hiding in bushes and hedgerows, from whence they may easily be dislodged during the day by beating the hedges on the side opposite to the direction of the wind, when the moths can be caught as they fly out. I have sometimes seen even butterflies fly out of hedges in this manner late in the afternoon. The stout-bodied moths conceal themselves more carefully during the day, and it is only occasionally that they are beaten out of hedges. Many of the Looper moths may also be met with sitting on the trunks of trees, but chiefly dull-coloured species, which resemble the bark in colour. Many, too, may be captured flying over flowers or about bushes or hedges towards dusk, or may be found at rest in outhouses. As a rule they are much more easy to collect than the Owl moths and other moths which are more strictly nocturnal in their habits.

The Lilac Beauty (*Pericallia Syringaria*, Linnæus; Plate XVII., Fig. 7) is a very pretty moth which is found in woods and gardens in spring and autumn. It is widely distributed in England and on the Continent, without being very abundant anywhere. The larva is brown or dull yellow, more or less tinted with violet, greenish or pale rose, and is very variable. It has humps on several segments, and two long fleshy tubercles at about two-thirds of the length of the body, and instead of assuming the usual attitude of a Looper caterpillar when at rest, it sits doubled up, holding on by its prolegs and claspers, without touching the branch on which it is resting with its front legs, in an attitude which looks excessively uncomfortable. It feeds on the lilac, after which it is named, but it will also eat privet, jasmine, bird-cherry, etc.

The Scalloped Oak moth (*Crocallis Elinguaria*, Linnæus; Plate XVII., Fig. 8) is a much commoner moth than the last, throughout Great Britain and Ireland, as well as on the Continent. The brown twig-like larva feeds upon all kinds of trees and shrubs, but, like the larva of the Satellite moth, it will devour other larvæ, even of its own species, whenever it can get them, a habit which, though unusual among caterpillars, is shared by those of several Owl moths, while we meet with a tendency towards the same cannibalism, in an incipient stage, in the larvæ of some of the Hawk moths, which will nibble the horns of their companions, while those of the Puss moth will nibble the curious defensive appendages of other individuals in the same manner.

The Speckled Yellow moth (*Venilia Macularia*, Linnæus; Plate XVII., Fig. 12) is a variable moth which is common in woods in early summer throughout the British Islands. One variety is yellow, with only four brown spots on the front margin of the fore wings; and another variety is brown. The green larva feeds on nettles and other low plants.

The Swallow-tail moth (*Urapteryx Sambucaria*, Linnæus; Plate XVII., Fig. 10) is the largest European moth belonging to the Loopers. It is a common species in England and Ireland, but only extends to the south of Scotland. It is plentiful in parks and gardens in all parts of the country, and may be caught flying in the evening in July about bushes and hedges, or may be beaten from them in the daytime. The larva is very variable, but is of some shade of brown, with paler stripes, and feeds on a great variety of trees and shrubs. Like so many Looper caterpillars, it has a great resemblance to a twig.

The Brimstone moth (*Rumia Luteolata*, Linnæus; Plate XVII., Fig. 11) is one of the most abundant of the Loopers all over Great Britain and Ireland. The moth flies in the evening, but is easily disturbed in the daytime. The larva is brown or green, with fourteen legs instead of ten, for the second and third pairs of prolegs are present, though they seem to be useless to the insect; the first pair, of course, is absent, and the fourth fully developed. It is rather stout, with humps on the back; and becomes a pupa in a thick cocoon, which is either fixed to the stem or to the lower branches of a tree, or is constructed among leaves on the surface of the ground. It feeds on hawthorn, sloe, and other trees.

The Orange moth (*Angerona Prunaria*, Linnæus; Plate XVII., Fig. 9) is another species which is common and widely distributed in England and Ireland; towards the north it becomes rare. It is remarkable for the disparity of the sexes, which is greater than what is usual in most of the allied species. We have figured the typical form of the male; but there is a variety in which the fore wings are varied with extensive patches of brown; and the female is not orange, but yellow. The larva is of various shades of brown, and resembles a twig; it feeds on sloe, and a variety of other trees and bushes.

The Magpie moth (*Abraxas Grossulariata*, Linnæus; Plate XVII., Fig. 4) is an extremely common moth all over the country in woods and gardens. It is also very variable (almost from black to white in the extreme forms), though there is no other insect for which it could be mistaken. The larva (Fig. 4*a*) is sometimes so abundant as to be injurious to gooseberry and currant bushes, though it will also feed on sloe, peach, apricot, etc. It is one of those exceptional larvæ which resemble the perfect insect in their colours. Our figure shows it in motion, arching its back; but the Looper caterpillars, after extending themselves to their full length, draw the two ends of their bodies close together, raising the middle into a regular loop, whence their name. Our figure shows the commencement of this process. Currant and gooseberry bushes are liable to the attacks of a great variety of insects. We have already mentioned the Currant Clear-wing, which feeds on the pith of the currant; but the most destructive of all are the small yellowish white, black-spotted grubs of several closely allied species of sawflies, which are gregarious, and sometimes systematically strip whole rows of currant and gooseberry bushes of their leaves in a few hours. The Magpie moth may often be seen in gardens in the afternoon and evening, and frequently flies by day.

There are several European species closely allied to this, one of which, the Clouded Magpie (*Abraxas Sylvata*, Linnæus; Plate XVII., Fig. 5), is not uncommon in woods and coppices throughout the British Islands, though it is not nearly so abundant as the Magpie moth of our gardens. The larva feeds on elm, bird-cherry, plane, and beech. On the Continent this species appears to be commoner towards the north and east than in the south.

The Clouded Border (*Abraxas Marginata*, Linnæus; Plate XVII., Fig. 6) differs much from the two Magpies, and is placed by many entomologists in a different genus. It is a pretty little moth, with strongly contrasted colours, and is very common throughout the greater part of the British Islands. Like the Magpie moth, it varies considerably in the extent and number of the brown bands and blotches on its wings, and some of the varieties are nearly white. The larva is dark green, with white or yellow longitudinal lines, and feeds chiefly on sallow, though it will also eat poplar and hazel. The moth is most abundant in damp, shady places.

Several moths belonging to the Loopers have females in which the wings are either absent or rudimentary, and appear in the perfect state either at the extreme end of autumn or the very earliest days of spring, or even in the dead of winter. One of these winter moths is the Mottled Umber (*Hybernia Defoliaria*, Linnæus; Plate XVIII., Fig. 1 male, Fig. 1*a* female). The larva is brown, with a yellow line on the sides, and a dark double line on the back. It feeds on a variety of trees, and is sometimes sufficiently common to be destructive, like others of the winter moths. The moth appears in November and December, and the wingless females climb up the trunks of the trees to deposit their eggs. It is therefore usual to paint the trunks of fruit trees with lime, or to tie wisps of straw round the trunks in such a manner that the females cannot pass the barrier; and this is a sufficient protection against these wingless enemies at any rate.

The Bordered White (*Fidonia Piniaria*, Linnæus; Plate XVIII., Fig. 5 male, Fig. 5*a* female) is an extremely interesting species. It is one of a small family of Loopers which fly by day, chiefly on heaths or in clover fields. The present species is larger than most of the others, and is unlike them also in the great disparity of the sexes, which is shown in our figures. It is common everywhere among fir and pine, on which the green larva, which is longitudinally marked with white and yellowish lines, feeds. It is very abundant, of course, in the great pine-forests of the Continent. The moth flies round the trees, frequently at a considerable height, but it may also be found resting on the trunks.

The Latticed Heath (*Fidonia Clathrata*, Linnæus; Plate XVIII., Fig. 6) is a day-flying moth which is allied to the last, though smaller, and very different in markings. It is common throughout a large portion of Great Britain and Ireland, flying in clover fields and on heaths in the daytime. The larva is green, and feeds on grass, clover, and various kinds of trefoil.

There are several Looper moths with very stout bodies, which appear in early spring, and in which the wings of the females are absent or rudimentary. One of these is known as the Belted Beauty (*Biston Zonaria*, W. V.; Plate XVIII., Fig. 2, male), the female of which has only rudiments of wings. The larva, which is green, with a yellow line on the sides, feeds on yarrow and other low plants. This insect is local, and not very common in Central Europe; in the British Islands it is almost confined to the sandhills on the coast of Cheshire and the immediate neighbourhood, and the east coast of Ireland. In France the moth is found among low plants, and also resting on the trunks of trees, and is generally met with in damp meadows, a curious contrast to the dry sandhills which it prefers in Britain, and a good illustration of the difference in habit which the same species may exhibit in different countries. The moth appears in April.

Another insect belonging to the same section as the last, but much commoner, and with fully developed wings in the female, which resembles the male, is the Pepper-and-Salt Moth (*Amphidasis Betularia*, Linnæus; Plate XVIII., Fig. 3). It is fairly common in most parts of the British Islands, and a black variety is frequently met with in England, and seems to be increasing in numbers. The larva varies considerably in colour, and our figure (Fig. 3*a*) shows the attitude in which many Looper caterpillars frequently rest on the branch of a tree, immovable for hours together, when they perfectly resemble a twig. It feeds on oak, birch, and many other forest trees and shrubs. The moth appears in May and June.

The Mountain moth (*Psodos Quadrifaria*, Sulzer; Plate XVIII., Fig. 4) is an extremely conspicuous little moth which flies by day, and is plentiful in the Alps, the Vosges, the Giant Mountains, etc., at a considerable elevation. The larva is yellow, with a white line on the sides. It feeds on dandelion in prefer-

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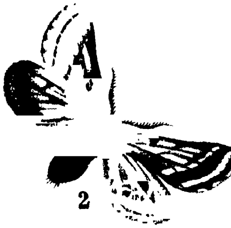
Plate XVIII.



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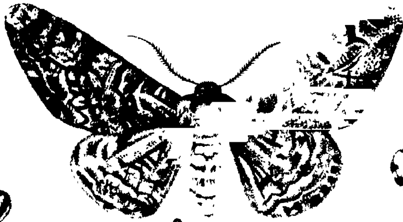

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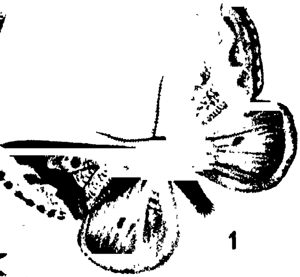

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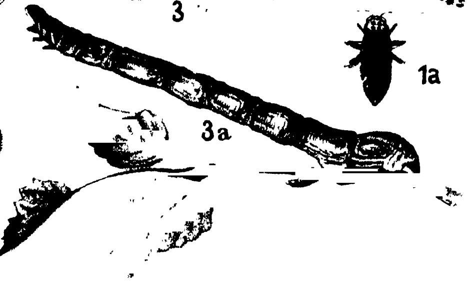

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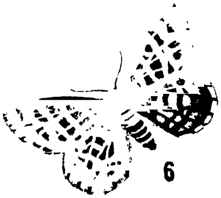

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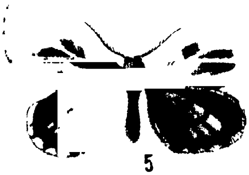

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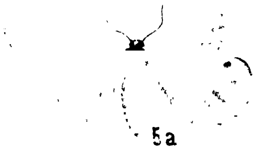

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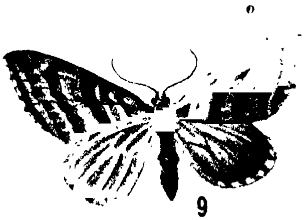

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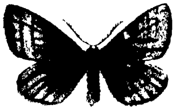

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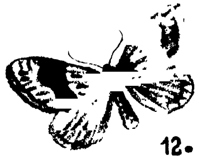

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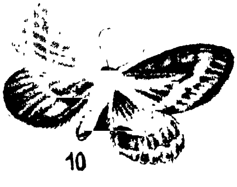

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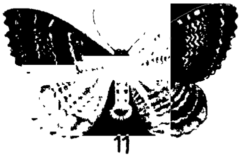

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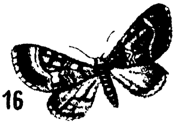

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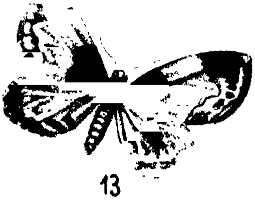

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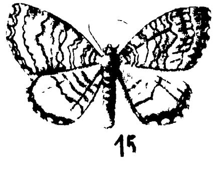

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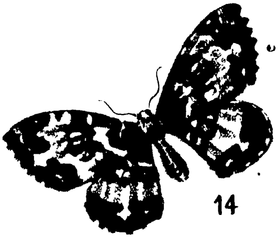

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ence, but will eat other low plants as well. It has a curious resemblance in colour to the small Mountain Ringlet butterflies which are found in the same localities. Some of the older authors placed it on the British list, but it is not an insect likely to be met with in this country.

Butterflies generally sit with their wings raised, and there are no European butterflies which are green on the upper surface of the wings, though there are several which are green beneath. But in tropical countries green butterflies are met with, though less frequently than those of other colours. However, there is a small family of Looper moths which are almost all of a green colour on the upper side of the wings, as well as beneath, and we have figured the largest of these, the Large Emerald moth (*Geometra Papilionaria*, Linnæus; Plate XVII., Fig. 1). These green moths are generally called Emeralds by collectors, and the Large Emerald, though not one of the commonest species, is widely distributed in the British Islands, frequenting woods, lanes, and hedgerows. The moth flies in the evening, after sunset. The larva is green, with red lumps, and feeds on various forest trees.

There is an extensive family of Looper moths, of a white or yellow colour, with transverse, zigzag dark lines, which are generally known as Waves. They sit with their wings expanded, and may often be seen resting on walls and tree trunks in that position in the daytime, or they may be beaten from hedges or bushes. They are of small size, and average about an inch in expanse. The Elegant Wave (*Acidalia Decorata*, W. V.; Plate XVII., Fig. 2), which we have figured as a representative of these moths, is common throughout the greater part of Europe, except in the British Islands and Belgium; but it is very similar to some of our British species, especially to the Lace Border (*Acidalia Ornata*, Scopoli), which may be distinguished from it by the borders of the wings, which are varied with grey, and ornamented with some tawny markings. The yellowish larva feeds on mint and thyme. The Lace Border, like several of the Waves, though common where it is found, is a very local species in the south of England, frequenting chalky districts. It is one of the prettiest of the Waves. There are other species, however, without tawny markings, which are among the commonest of the British Loopers. The larva of the Lace Border is brown, with dark lines and markings, and feeds on thyme.

The Pink-striped moth (*Pellonia Vibicaria*, Clerck; Plate XVII., Fig. 3) is another pretty species which has not yet been found in England, though it is fairly common on the Continent, where the larva, which is yellowish, feeds on sloe and broom.

The Chimney Sweep (*Odezia Atrata*, Linnæus; Plate XVIII., Fig. 8) is peculiar among our British Loopers for its uniform sooty colouring, only relieved by the narrow white fringes towards the tips of the fore wings. It is a very common insect, flying over flowers in the daytime, but seems to prefer hilly, or mountainous districts to level country. The moth is widely distributed in Southern and Central Europe, and the green larva feeds on chervil and other low plants, preferring the flowers. The only allied European species, the White-marked Chimney Sweep (*Odezia Tibiale*, Esper), has never been found in Britain, and may be known by having an irregular white mark on the fore wings which has been thought to resemble a stocking in shape, just as the shape of Italy on the map has been compared to a boot.

The Purple-barred Yellow moth (*Lythria Purpuraria*, Linnæus; Plate XVIII., Fig. 7) is very similar to the Pink-striped moth figured on the preceding plate, but is much smaller, though it varies considerably, not only in size, but in the relative position of the lines on the wings and in the distribution of colours. It is a day-flying insect, like the last, preferring the warm slopes of hills, though it is also to be found in grassy meadows. In the British Islands it is a great rarity, though it is sufficiently common on the Continent. The larva is dull green or rosy, with the lower part of the body of a brighter green. It feeds on sorrel, knot-grass, and other low plants.

The Treble-bar (*Anaitis Plagiata*, Linnæus; Plate XVIII., Fig. 9) is a very common moth throughout the British Islands in woods and hedgerows, from which it is easily disturbed. The larva is reddish brown, with dusky lines, and a yellow stripe on the sides. It feeds on St. John's Wort, preferring the flowers, and drops to the ground at the least alarm.

The Scallop Shell (*Scotosia Undulata*, Linnæus; Plate XVIII., Fig. 11) is remarkable for the unusual number of slender waved lines on the fore wings, in which it resembles no other European species. It is widely distributed in England, and has also been taken in Ireland; but it is not generally abundant. The larva is grey, with paler longitudinal lines, and feeds on sallow.

The Purple-barred Carpet (*Larentia Ocellata*, Linnæus; Plate XVIII., Fig. 12) belongs to a numerous division of the Loopers, which are popularly called Carpets, on account of the regular patterns on their wings, which they display more or less fully when resting on walls or tree-trunks, as they are frequently in the habit of doing. They are moths of moderate size, generally measuring from an inch to an inch and a half in expanse, and most of the British species are common and widely distributed in our islands, and some are very abundant, those which are really rare or local being exceptional. The Purple-barred Carpet is common in woods and gardens, and the larva is brown with white lines and angular markings, and feeds on bedstraw.

The Yellow Shell (*Larentia Bilineata*, Linnæus; Plate XVIII., Fig. 15) is a widely distributed insect throughout Europe and Northern and Western Asia, and is probably the commonest of all the Loopers in the British Islands. In many places you can hardly shake a bush or a hedge without disturbing several specimens, which fly a short distance, and then seek some fresh hiding-place. The larva is green with dark spots, varying in colour, on the under surface. It feeds on grass, and hides itself under stones or clods in the daytime.

The Argent and Sable moth (*Larentia Hastata*, Linnæus; Plate XVIII., Fig. 14) is a very conspicuous species, owing to the sharp contrast between the deep black alternating with white which its wings display, though it is very like some rather smaller species in which the contrast of colours is not so great, but which are very similarly marked. The larva is brown with a row of yellow spots on the sides. It is gregarious and feeds on birch; and the insect is widely distributed in the British Islands, without being very abundant.

The Beautiful Carpet (*Larentia Albicillata*, Linnæus; Plate XVIII., Fig. 13) is less abundant than some of the species which we have been considering, but is far from rare. The moth is fond of shady woods, where the larva, which is green with red spots on the back and red lines on the sides, feeds on bramble and raspberry.

The Winter moth (*Cheimatobia Brumata*, Linnæus; Plate XVIII., Fig. 10 male, Fig. 10*a* female) is a very common and destructive species. We have already spoken of other winter moths, and of the means by which the females may be prevented from depositing their eggs on the trees. In the present species the female is not quite wingless, but, as will be seen by the figure, the wings are so short and rudimentary as to be totally useless for flight. The moth appears in November and December, when the trees are already leafless, and the larva, which is green, with several white lines on the sides, lives on fruit and forest trees in May, and is sometimes met with in such incredible abundance that the trees on which the caterpillars live are scarcely able to provide a sufficiency of leaves for their voracity.

The largest genus of the Loopers includes a great number of small dull-coloured moths, seldom measuring as much as an inch in expanse, which are generally known as "Pugs." A few species are more or less white or green, but the great majority are of some shade of brown, and many of them are so much alike that the most experienced entomologists often find it very difficult to distinguish one species from another satisfactorily.

The Netted Pug (*Eupithecia Venosata*, Fabricius; Plate XVIII., Fig. 16) is a comparatively large and distinctly marked species, which is locally common throughout the British Islands. The moth may be found flying over the flowers of different species of campion and catchfly in the evening, and the larva, which is greenish or bluish, lives on the seed capsules of these plants. Particularly fine specimens of the moths have been taken on the Hill of Howth, near Dublin, flying among the many species of Owl moths, rare and common, which fly over the flowers of the bladder campion in that locality. The Netted Pug is widely distributed on the Continent, but is not a very abundant insect. The Pugs are among the smallest of the Looper moths, and one of the small green species is very destructive to apple and pear blossoms, the green caterpillar eating out the contents of the buds.

THE PEARLS AND CHINA MARKS.

We now come to the moths known as *Pyralidæ*, which are of small or moderate size. with long slender bodies and antennæ, and long, narrow triangular fore wings, the hind wings being generally shorter and broader.

They are not nearly so numerous in Britain or in Europe as the Owl moths or the Loopers.

Two species of this family are common everywhere in Britain in houses, the Meal moth (*Pyralis Farinalis*, Linnæus) and the Tabby moth (*Aglossa Pinguinalis*, Linnæus). The Meal moth, which appears to be equally common over a great part of the world, measures about an inch across the wings. The fore wings are of a reddish grey, crossed by two waved white lines wide apart, the space between which is ochreous yellow, and marked with a black dot in the centre; the hind wings are brownish grey, with less distinct white lines. The larva feeds on chaff, and probably on dried plants, not on flour, as was formerly supposed. The moth is very common in barns and outhouses, and sometimes in houses, resting on walls, ceilings, etc.

The Tabby moth is larger, sometimes exceeding an inch and a half in expanse; it is dark grey, with two irregular, indistinct paler lines. The larva is dark brown, and is similar in habits to that of the last species, though it was formerly believed to feed on butter and grease.

The slopes of the hills, especially in the south of England, are enlivened by the presence of many small day-flying moths belonging to the Pyralidæ, which often hardly exceed, and sometimes do not even attain to, half an inch in expanse of wing. Some of them are of a purplish red, with golden yellow lines and spots, while others are black or brown, with white or grey markings. In Switzerland they are accompanied by a considerable number of other species which are not found in our islands.

If we go down to the weedy banks of a pond or slowly flowing stream in summer, and search among the reeds and rushes, we shall probably find some of the China Marks, which are moths rarely exceeding an inch in expanse. They are black or brown, with white or yellowish markings, and their larvæ feed on water-lilies and other water plants. There are several species, and the Small China Mark (*Cataclysta Lemnata*, Linnæus), which is also the whitest, feeds on duckweed.

Two species of the Pyralidæ are common everywhere among nettles: the Mother-of-Pearl moth (*Botys Ruralis*, Scopoli), and the Small Magpie (*B. Urticata*, Linnæus). The former is of a shining glossy grey, with darker grey markings; it measures rather less than an inch and a half in expanse. The Small Magpie is dark brown or blackish, with extensive white markings, in almost equal proportions, and some tawny dashes towards the base of the fore wings. It is about an inch and a quarter in expanse.

THE KNOT-HORNS AND GRASS MOTHS.

These are small moths, seldom much exceeding an inch in expanse, and often less. The fore wings are long and narrow, and the hind wings are broad and rounded, and folded round the body under the fore wings, when at rest, into a very small compass

The Knot-horns are mostly inconspicuous dull brown or greyish insects; the males of several species have a large tuft of scales near the base of the antennæ, from which they derive their name. One or two species are more conspicuously coloured, being white with black spots; or reddish with brown lines; but the prettiest species is the Rosy Veneer (*Pempelia Semirubella*, Scopoli), which has rosy fore wings, bordered in front by a greyish stripe, and behind by a broad yellow one; the hind wings are grey, more or less tinged with rose-colour. It is found in clover fields and waste places in Kent and the neighbouring counties, but is rather scarce and local; the dark-coloured larva feeds on trefoil.

The Grass moths (*Crambidæ*) are always abundant in meadows and grassy places. They generally have whitish or yellowish fore wings, often traversed by a longitudinal silvery streak, and brown hind wings. They are remarkable for the great length of the palpi, which project like a beak, as in the case of one or two butterflies and moths mentioned in an earlier part of this book. They average about an inch in expanse of wing.

THE BELL MOTHS.

The moths classed under this heading are very numerous. We have more than 300 different species in the British Islands, but they are all of comparatively small size, the largest species rarely measuring more than an inch in expanse, and most of them considerably less. The fore wings are usually conspicuously narrower than the hind wings, and truncated at the extremity, and the hind wings are broad and rounded. The wings are not folded round the body in a small compass, as in the case of the Grass moths, but are laid flat. In this position the two fore wings, lying side by side close together, without overlapping, frequently assume a shape not unlike that of a small bell, whence the name of the moths. In Latin they are called *Tortrices*, or Twisters, because the larvæ of many species roll a leaf round their bodies, in which they live. Those of many species, however, live under the bark of trees, or feed on the seeds of plants, and in various other situations. Several species are destructive to fruit or forest trees, such as oak, apple, vine, and plum. The fore wings of the Bell moths are very varied in colours and markings, but never exhibit a characteristic pattern running through a considerable number of genera and species, as is the case in many of the Owl moths and Loopers. The Goat moth (*ante*, p. 64) has been included in the Bell moths by some recent authors.

The commonest and most destructive of the Bell moths in England is the Green Oak moth (*Tortrix Viridana*, Linnæus), which has bright green fore wings and dark grey hind wings; the front edge of the fore wings is yellowish. The larva is green, and feeds on oak, and various other forest trees. In summer almost every oak tree is full of this insect, and the small larvæ may often be seen swaying in the breeze at the end of a thread, even if not disturbed; but if the tree is shaken, both moths and larvæ will often fall from it in a regular shower, the latter suspended by their threads.

There is one species which cannot be mistaken for any other, on account of its peculiar form. In most insects the edge of the front wings is either straight or gradually arched; but in the Notch-wing (*Teras Caudana*, Fabricius) the middle of the fore wing is deeply excavated. The moth is very variable: the fore wings are brown, grey, or reddish, with darker markings, and the hind wings are lighter coloured. The larva is green, and feeds on sallow and willow. This curious moth seems to be common throughout the British Islands.

Many species are abundant in gardens and about hedges, and several species are attached to roses. These were mostly called "Brown Cloaks," or "Short Cloaks," by the older writers on entomology, and among them are two very similar species (*Spilonota Cynosbana*, Fabricius, and *Rosæcolana*, Doubleday) which are brown, with a large white blotch on the hinder edge of the fore wings, filling up a great portion of the middle of the wing. The hind wings are pale grey. The larvæ are brown, and live in the shoots of roses.

A considerable number of species have a conspicuous white blotch, varying in size and shape, in the middle of the hinder edge of the dark fore wings; but the most conspicuous of these is, perhaps, the White-foot Tortrix (*Halonota Fœnella*, Linnæus), in which a curious white streak rises from the hinder edge of the chocolate-brown fore wings, near the base, and turns outwards and downwards at about the middle of the wing, thus assuming a shape which some authors have fancifully compared to a white foot, and others to a bird's head and neck; the hind wings are brown. The larva is yellowish white, and feeds on mugwort. The moth is not uncommon in the south of England, and may easily be recognised by the peculiar mark on the fore wings. It does not exceed an inch in expanse.

Several pretty little pale yellow moths, about three-quarters of an inch in expanse, are common in gardens; one of these, the Chequered Pebble Tortrix (*Dictyopteryx Contaminana*, Hübner), often has a brown Y-shaped mark across the middle of the fore wings. The yellowish green larva lives on hawthorn and other trees and shrubs. This moth has rather broad fore wings, pointed at the tip; but there is a very pretty little species, bearing the clumsy name of the Hook-marked Straw Tortrix (*Xanthosetia Hamana*, Linnæus), which has rather narrow sulphur-yellow fore wings with some slight reddish markings, and brown hind wings. It is found among thistles, on which there is little doubt that the larva feeds.

Some of the common Bell moths vary to such an extent that it seems almost impossible to describe them. In some cases as many as twenty, or even thirty, species described by the earlier writers on entomology are treated as varieties by recent authors. The older authors were not to blame for this, for when collections and collectors were few, and specimens scarce, they could not know that insects which looked very different when placed side by side would prove, when better known, to be connected by an unbroken chain of intermediate variations; and it is only forty years since the epoch-making work of Darwin threw a new and wholly unexpected light on the whole question of the variation of species. But in our own day, unless a form seems to be a well-marked constant variety, it is a great pity to burden our overloaded lists with names bestowed on impermanent varieties connected with other forms by regular gradations; or on sports and aberrations, perhaps due to some accidental cause which may never occur again.

Some of the Bell moths are prettily but very simply marked. One of these is the Double Orange Spot Tortrix (*Eucelis Aurana*, Fabricius), a little species less than half an inch in expanse, which has two conspicuous orange spots on each of its brown fore wings. It is widely distributed in the British Islands, and flies in meadows over flowers in the daytime.

Among the Bell-moths which attack fruit, the commonest and most destructive insect in Britain is the Codling Moth (*Carpocapsa Pomonella*, Linnæus), which is equally common, and equally, if not more destructive, in all parts of the world, wherever apples are grown. The moth measures about three-quarters of an inch in expanse, and may easily be recognised by the coppery markings towards the extremity of its dark fore wings. It feeds on apple, and, less frequently, on pear, most generally in the fruit, though it is sometimes met with under the bark of the trees.

The Bell moths have been less thoroughly worked out than the Clothes moths and their allies which we have next to consider, and are, perhaps, on the whole, less interesting.

THE CLOTHES MOTHS AND THEIR ALLIES.

The insects allied to the Clothes moths are extremely numerous, and alone comprise more than two-thirds of our British butterflies and moths. But the members of the species are all small; the largest rarely attain to an inch in expanse, and a great number expand less than half an inch, while many do not even attain half that size. The smallest of all measures less than one-sixth of an inch in expanse of wing. But they are divided into many families and genera. Many species are extremely beautiful, while others are remarkable for various peculiarities of structure, while there is a great diversity of habit among them.

Comparatively little was known of this very interesting group of moths till the late Mr. Stainton took up their study as a speciality, and completely revolutionised it, carefully investigating the habits, metamorphoses and structure of every species which he could obtain, and working up the whole subject as thoroughly as he was able.

The true Clothes moths form a comparatively small proportion of this vast aggregate of genera and species; but several of the species feed on cloth, fur, feathers, horsehair, and other animal products, and may be found in houses almost all the year round. Three species we may specially mention—the original Clothes moth (*Tinea Pellionella*, Linnæus), a dark grey moth with three brown spots on each of the fore wings; the Shining Clothes moth (*Tinea Bisclliella*, Linnæus), with greyish yellow, rather shining fore wings and whitish hind wings; and the Variegated Clothes moth (*Tinea Tapetzella*, Linnæus), in which the fore wings are blackish on the inner half and whitish on the outer half—a style of colour which is not unlike that of some of the Bell moths. Another species, the Corn moth (*T. Granella*, Linnæus), which has whitish fore wings, with scattered dark markings, and pale brown hind wings, is often very destructive in granaries. All these species have very long fringes, especially on the hind wings, which are much narrower than the fore wings, and generally uniform in colour.

Among the most curious and beautiful of the moths that are generally classed in the immediate neighbourhood of the Clothes moths are the Long-horn moths, several species of which are common in England and Ireland, though they are most abundant in our southern counties. They fly about bushes in the daytime in May and June, and their bright metallic colours render them very conspicuous. They are small moths, measuring half an inch or three-quarters of an inch in expanse, and are remarkable for the great length of the long, slender antennæ, which are about three times as long as the expanse of the wings of the insect. One of the commonest and most widely distributed species in England is the Green Long-horn (*Adela Viridella*, Linnæus), which is of a bright bronzy green, without markings. Other species are yellowish, streaked towards the base of the wings with violet-brown, and marked with a yellow transverse band, bordered with violet-brown. The largest of these species is De Geer's Long-horn (*Adela Degeerella*, Linnæus). All these moths have purplish-brown hind wings, and their larvæ live in cases on wood anemone and other low woodland plants.

Next to the Clothes moth, the Small Ermine moths, of which there are several species, are perhaps those which are most likely to fall under the notice of an observer who is not an entomologist. There are several species, all very much alike, with grey or white fore wings marked with rows of round black dots; the hind wings are usually of a leaden grey. The larvæ are grey with numerous black spots, and they spin webs all over their food-plants; the pupa is enclosed in a cocoon. They feed on various trees and shrubs, and the Small Ermine moth of the apple (*Hyponomeuta Padella*, Linnæus) is often very destructive to hawthorn, apple, and other trees. The larger moths measure nearly an inch in expanse.

Another equally destructive moth, which attacks cabbages, turnips, etc., is the Diamond-backed moth (*Plutella Cruciferarum*, Zeller), which has very narrow light brown fore wings and lighter hind wings. Along the hinder edge of the fore wings is a whitish band projecting upwards in three undulations. The larva is green, and feeds on turnip, etc. The moth measures about two-thirds of an inch in expanse. It has been introduced into all parts of the world, and is just as destructive everywhere as in Europe; there is a succession of broods throughout the year.

Many very pretty species of this extensive group, besides the Long-horns, fly in woods by day in early summer. Many of these are very beautiful, but are mostly of small size. One very pretty insect has broad wings with short fringes, and was originally classed as a Bell moth. It has fore wings of a yellowish grey, suffused with pink, and may be easily known by a yellow dash at the base of the front of the fore wing and a yellow spot beyond the middle. The hind wings are pale yellow. It may be called the Small Oak Beauty (*Phibalocera Quercana,* Fabricius). Its green larva lives under a web on the under side of oak and other trees. The moth expands three-quarters of an inch.

Another beautiful spring insect is Geoffroy's Moth (*Harpella Geoffrella,* Linnæus). The wings are more oval, and the fringes are longer than in the last species, but still the wings are comparatively broad. The fore wings are yellow, varied with brown and streaked with blue; beyond the middle are two conspicuous yellow spots on the upper and lower margins of the wings respectively; the hind wings are brown.

A third common day-flying insect is the Small Sulphur moth (*Œcophora Sulphurella,* Linnæus). It measures two-thirds of an inch in expanse. The wings are rather long and narrow, with long fringes, and the fore wings are brown with some slight yellow spots and dashes, and the hind wings are pale yellow. The larva is greyish white, and feeds on rotten wood.

Other species besides this feed on rotten wood; and there is a very curious story told of one of these, called the Manchester Moth (*Acompsia Woodiella,* Curtis). It is rather smaller than the last species, and has bright orange fore wings marked with five dark brown spots; the hind wings are brown. Once, and once only, a number of specimens of this conspicuous moth were found in a hollow tree on Kensall Moor, near Manchester, by a collector named Wood. Neither he nor anyone else ever saw another specimen alive; it was only met with on one day, in one particular tree, and never again. Whether it was a single brood accidentally introduced from somewhere abroad, or whether it was the last brood of a species on the point of extinction, or, finally, whether it is a species of such retired habits that no one has been able to find more specimens, no one can say. It is one of the most puzzling problems in the whole range of British entomology.

Among the larger and duller-coloured species of this group are those belonging to an extensive genus of moths called *Depressaria* by Haworth, and Flat-bodies in popular entomological parlance. They have a flattened appearance, rather broad grey or brown fore wings, which sometimes measure nearly an inch in expanse, and rather short fringes as compared to many of their allies. The moths appear in autumn and hibernate, reappearing in early spring. The larvæ feed on broom, furze, thistle, and various other plants. There are about forty species in the British Islands.

There is a conspicuous little moth known as the White-shouldered Moth (*Endrosis Lacteella*, W. V.), which is very common in houses, and is often mistaken for a Clothes moth, though it is quite harmless, and is not very closely related to them. It has rather long and narrow greyish wings varied with darker, and it measures rather less than three-quarters of an inch in expanse. But the head and thorax are snow white, so that it cannot be mistaken for any other similar moth. The larva is whitish, with a reddish head, and feeds on dry rubbish.

One of the commonest of the smaller garden moths is the Lilac Pigmy (*Gracillaria Syringella*, Fabricius). It is a pale yellow insect, with darker markings, and the hind wings are brown; it measures half an inch in expanse. The larva is whitish, and lives under blotches in the leaves of lilac and privet. The moths usually fly out in plenty when a lilac bush is shaken; or they may be seen resting on the leaves.

There are a considerable number of small moths, with long and very narrow wings with long fringes, the larvæ of which live in cases. They usually measure from half an inch to three-quarters in expanse. Many of them are beautifully marked and coloured; others are more uniform. The prevailing colours are white, yellow, green, and brown. They belong to the genus *Coleophora* (Hübner).

Here and there we meet with moths which are rather peculiar in their habits. One of these is the Wine Pigmy (*Œnophila V-flava*, Haworth), a little brown moth, less than half an inch in expanse; the fore wings are marked with a yellow V in the middle, and two small yellow spots beyond. It is generally found in wine cellars, where its whitish larva feeds on corks and fungi.

There are a great number of small species with long wings, sometimes beautifully coloured, and sometimes with exquisite metallic spots and markings, which it is impossible to notice in detail. Among these are the species of ***Eluchista*** (Treitschke), which average about one-third of an inch in expanse of wing; their larvæ mine in the leaves of different species of grass. But the smallest of the species of *Lithocolletis* (Hübner) are of about the same size, and their larvæ mine in the leaves of trees. So, likewise, do the larvæ of the genus *Nepticula* (Zeller), which, as already mentioned, includes the smallest known moths. Few of them exceed, and many do not even attain to, the respectable dimensions of a quarter of an inch in expanse; and the Nut-tree Pigmy (*Nepticula Microtheriella*, Stainton), one of the smallest moths known, falls considerably below the sixth of an inch in expanse. It has purplish-brown fore wings, crossed by an oblique whitish stripe, and light brown hind wings. A larger and, perhaps, commoner species, the Bramble Pigmy (*Nepticula Aurella*, Haworth), is golden-brown, flushed with purple, and with a golden transverse band. The hind wings are brown. The yellowish larva mines in the leaves of bramble.

One peculiarity of the larvæ of the almost microscopic moths of the genus *Nepticula* is that they have no true legs, three pairs of which, corresponding to those of the perfect insect, are well developed in the larvæ of nearly all butterflies and moths; but they have no less than nine pairs of rudimentary prolegs.

‘Here we may mention another curious genus which used to be placed near the true Clothes moths, but which is now frequently placed by itself at the very end of the moths. It was named *Micropteryx* by Hübner, and the moths are golden-green or purple, and usually measure less than half an inch in expanse. The antennæ are very short. The moths are remarkable for having the veins of the hind wings arranged similarly to those of the fore wings, whereas in most butterflies and moths (except the Swift moths) the veins of the hind wings are much less numerous than those of the fore wings. The larvæ have no feet, and live in blotches on the leaves of trees. And here we may mention that, besides the larvæ of the small moths and those of some beetles, those of certain two-winged flies likewise form galleries or blotches on the leaves of different plants. It appears that the diminutive size of the smaller insects gives them the opportunity of exhibiting a much greater range in diversity of habit than is possible to the larger species.

THE PLUME MOTHS.

The Plume moths form a small isolated group, and are quite peculiar in their structure. Here and there, especially, perhaps, in the Comma butterfly, we have seen that the outline of the wings of a butterfly or moth may be irregular; but in the Plume moths the wings themselves are cleft into separate feathers. In the ordinary Plume moths the fore wings are bifid, being more or less divided by a cleft; but the hind wings are divided almost to the base into three separate feathers. The smallest Plume Moths measure rather more than half an inch, and the largest rather more than an inch in expanse. They have very long, slender legs, and when they hang on a leaf, or on a stalk of grass, as they are frequently in the habit of doing, they look very much like a small Daddy Longlegs, or Crane fly. Most of the species are white, brown, or yellowish; but one of the largest and commonest is the White Plume moth (*Pterophorus Pentadactylus*, Linnæus), which is almost pure white, and is often to be noticed in weedy places, among strawberry beds, and elsewhere. The green larva feeds on bindweed.

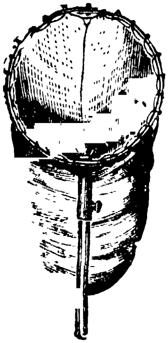
The Twenty Plume moth (*Alucita Hexadactyla*, Linnæus) belongs to a different section to the other Plumes. Each wing is split up into six separate feathers, thus actually making twenty-four plumes (instead of twenty). It is a somewhat variable insect, but is grey, or yellowish grey, with darker markings. The larva feeds in the buds of the honeysuckle, and the moth may often be found at rest on walls and palings, with its wings fully expanded, when it looks like a small Looper moth. It measures rather less than three-quarters of an inch in expanse.

ON COLLECTING BUTTERFLIES AND MOTHS.

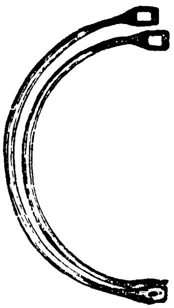
Without some reference to collecting, a book on butterflies and moths would hardly be considered complete. It is impossible for us to go very deeply into the subject in the present little book; nevertheless, a few general observations may not be out of place, though the advice of a friend who has already had some experience will probably be more useful to a beginner than any printed instructions.

First as regards capturing insects. You cannot catch a butterfly in your cap, or much less knock it down with a stick, without great danger of spoiling the specimen. Even when captured, butterflies require very careful handling, for a touch is enough to rub off the scales from the wings, and spoil their beauty, apart from the danger of breaking them. Specimens that have been long in the cabinet become still more brittle, and should never be touched with the fingers at all, but lifted by the pin. The antennæ are particularly brittle, and if they are broken off, the value of the specimen is greatly lessened.

Butterflies and moths are generally captured with a net. The net generally used is made of green gauze, which had better not be attached directly to the ring of the net, but to a piece of more solid stuff, which is sewn loosely round the ring, so that it will slip off and on. The ring of the net is jointed so that it will fold up, and if it folds into two or four pieces, it can easily be carried in the pocket (*see* the accompanying illustrations for figures of the net). When the net is required for use, the ring is expanded and screwed on the end of a stick. A common walking-stick will answer the purpose as well as any other, and when the net is not fixed a metal cap is screwed on the stick instead, to keep out dirt.



BUTTERFLY NET READY FOR USE.

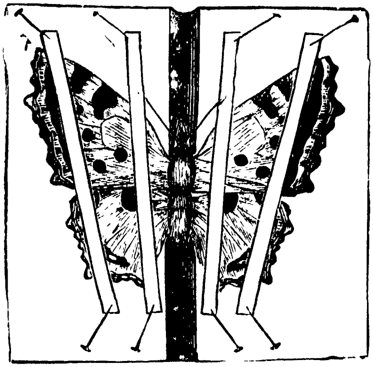


RING, FOLDED.

It is not, generally speaking, good policy to attempt to run a fast-flying butterfly down. The slow-flying ones can easily be captured without exertion, and most of the swift-flying butterflies are in the habit of settling occasionally on flowers, or on the ground, especially in damp places, and many are accustomed to return to the same spot at frequent intervals.

If you have a butterfly in the net, fold the net over it so that you can take it gently between the thumb and finger, with the wings closed over the back. A sharp nip under the thorax will kill it, taking care not to crush the head or abdomen, which need not be touched; and not to break off the antennæ or legs, or injure the wings. But if you see that the specimen is damaged already (and butterflies that have been long on the wing often get very much faded and tattered) let it fly, for it is not right to destroy more butterfly-life than is absolutely necessary for purposes of study.

When the butterfly is dead a pin should be carefully thrust through the middle of the thorax (the middle portion of the body, to which the wings and legs are attached), and the specimen may then be pinned into the collecting box, which is usually a small deal box lined with cork, above and below, and of a convenient size to go into the pocket. On reaching home it must be "set." For this purpose a setting-board is required. Setting-boards (or "saddles," as they are called by many entomologists) are of different sizes, and have a groove down the centre, in which the pin is inserted, and then the wings are carefully drawn out with a needle, taking great care not to tear them, to pierce them, or to break the nervures, and are retained in their places by strips of card or


A SETTING-BOARD.

paper, as shown in the accompanying figure, till they have stiffened into the required position. In former times English setting-boards were usually made with sloping sides, but the Continental fashion of setting them flat, which is much superior, has latterly come into vogue. Still, insects are not generally set so high on the pin in England as on the Continent. Setting-boards are often arranged to slide into a small case, called a "setting-house."

Stout-bodied moths are more difficult to kill than butterflies; and they are generally killed with chloroform or ether, or are killed by being placed in a poison-bottle. The most unobjectionable form in which this can be used is, perhaps, a laurel-bottle, which is made by half filling a glass-stoppered jar with chopped laurel leaves.

Many collectors are in the habit of carrying a supply of strong round chip or pasteboard boxes with them, into which they put moths (only one in each box), and bring them home alive to be killed and set at home. If an insect has become so stiff that you cannot expand the wings, or if it requires resetting, it must be relaxed. This is very easy. You have only to lay it in a closed vessel on damp sand, and in a few hours its muscles will have become so far relaxed that you can spread out the wings. But the relaxing jar must be carefully watched, for if specimens are left in it too long they are liable to rot. Insects must not be taken off the setting-boards till quite stiff.

Moths may be captured with the net, in the case of day-flying species, or may be caught flying over flowers in the evening. A few butterflies will settle on walls or tree-trunks, but they are generally so wary and active that it is peculiarly difficult to catch them in such a position. Not so with moths. Many moths are in the habit of settling on tree-trunks, walls and palings, and will rest there motionless for hours together. Many moths will come to "sugar," as explained in another part of the book, and many are attracted by light. Gas-lamps, electric lights and lighthouse beacons are very attractive to them, and great rarities have not unfrequently been met with at such lights. Indeed, it is much to be feared that some species of moths may actually be exterminated in certain localities by their flocking to these destructive lights.

An invention has been tried called a moth-trap, which it was thought would have attracted many moths by the aid of a strong light; but I do not remember hearing of moths of any special rarity being captured by its means, and I should not recommend a beginner to invest in one.

Butterflies and moths can either be kept permanently in large double wooden boxes, lined at the top and bottom with cork, or in a cabinet. A cabinet consists of a chest of drawers, which are deep enough for the insect to be pinned into the cork with which they are lined, and fitted with removable glass covers. It must be remembered that light bleaches butterflies and moths, and that they must therefore be kept in the dark, and they are also liable to be devoured by mites, the grubs of certain beetles, and other pests. These may be kept away by the use of camphor, solid naphthaline, or some other strongly smelling substance. Occasionally, if a house is infested with mice, these have been known to devour some of the insects that have been left exposed on a setting-board.

With the exception of cabinets, which are always expensive, the entomological apparatus (including proper pins, for ordinary pins are too short and thick for entomological purposes) may be bought at a trifling expense from any dealer in objects of natural history. But if a beginner wishes to make his own apparatus, or is short of money, he need not spend much on a net or boxes. A forked stick will answer instead of a walking-stick, and the net may be tied to a ring of willow twigs, and tied between the arms of the fork, while sliced-up corks glued to the bottom of some old box will answer as a temporary receptacle for specimens.

But though this may not be necessary, it is a mistake for a beginner, even if money is no object to him, to buy everything he fancies he may require at once. It is better to begin with a net and a few boxes, and to gradually increase your store of apparatus as it is required. If you buy an expensive cabinet at once, you will be very likely to get tired of the work long before you have filled it; but if you begin with a few boxes, and add to them as you need them, by the time you really need a cabinet, you will be much better able to appreciate it.

Do not collect specimens for exchange, or barter specimens; but if you have any to spare for a fellow entomologist to whom they would be useful, give them freely, and do not be above receiving similar kindness in return, or be jealous of the success of other entomologists in finding rare insects. And remember that tastes differ, and that there is much to be learned about other things besides butterflies and moths. If they interest you, they may not interest everyone; and perhaps you may have a friend who prefers to collect beetles or bees. Don't disparage or under-value his studies because they are different from yours. I am sorry that such a caution should be needed; but it often is.

One interesting branch of the subject to which I have not yet referred is rearing caterpillars. These must be supplied with fresh food every day, and all old food should be removed; but the larvæ should be disturbed as little as possible. A layer of earth covered with moss should be placed at the bottom of the box, for many larvæ burrow in the ground when about to change to pupæ.

Many larvæ will feed on a variety of plants, but others will eat nothing but one particular plant. In any case it is always advisable to feed them on the same plant on which they were feeding when found, even though they may belong to a species which is not particular about its food. If the proper food-plant cannot be procured, or if you have larvæ which you wish to rear and do not know their food, it is sometimes necessary to try experiments as to what they will eat. It is said that many caterpillars will eat common knot-grass in the absence of other food.

Some plants support a great variety of insect life; among trees the oak, and among herbs the nettle, are greatly liked by insects; and several hundred different species of insects feed upon them, among which are the larvæ of many butterflies and moths.

Experienced entomologists sometimes rear insects from the egg. Some insects will lay eggs freely, even on the setting-boards sometimes, so that there is no difficulty in attempting this. But it is perhaps more satisfactory and less tedious to collect nearly full-grown larvæ, and try to rear these. But you must not be disappointed if many of the larvæ you are trying to rear die, either without apparent cause, or from the attacks of parasites, a danger from which you cannot easily protect them.

In addition to larvæ, you will sometimes meet with pupæ. Many of these are found just below the surface of the ground, and some entomologists have met with considerable success in digging for them with a trowel near the roots of trees in late autumn and early winter.

THE SEASONS.

During the winter most butterflies and moths are torpid in one of their four stages. Some species pass the winter in the egg, and emerge in the spring. In some species the eggs hatch in autumn and the larvæ cease to eat and retire to winter quarters, while other species pass the winter in the pupa state. But there are several butterflies and moths, such as the Brimstone butterfly, the Tortoiseshells, and the Herald moth, which hide themselves in some sheltered place, and pass the winter in the perfect state. Sometimes they are disturbed in their winter quarters, or an unusually fine day in very early spring may tempt them forth, and thus we may account for the occasional appearance of a Tortoiseshell butterfly in December or January. But besides these there are several species of moths which naturally appear in the perfect state in winter, and nearly all these have apterous females.

Apart from these winter moths, and the occasional appearance of a hibernating butterfly, there is little to be seen in the way of perfect butterflies and moths at the beginning of the year till the sallows begin to bloom. During the day the yellow catkins are lively with early spring bees, and at dusk they are visited by a variety of moths, which can easily be captured with a net.

During April butterflies and moths become more numerous, but in May and the early part of June many of our most conspicuous butterflies and moths are on the wing. In the meadows we find the Orange Tip among the more numerous Whites, and the Green Foresters and the green and red Burnet moths; and in open glades in the woods the small Fritillaries and the Bee Hawk moths are to be met with, while the Speckled Wood butterfly and, a little later, the Ringlet sport around the bushes. The Ringlet is the only butterfly in the south of England which looks black upon the wing; the White Admiral is black and white, but the Ringlet, when flying, looks nearly black. So do the Mountain Browns, but they are not found further south than Lancashire.

In the course of June there is a change. The Meadow Brown now swarms everywhere in the fields, and the small Fritillaries are replaced by the larger ones. They have a splendid appearance on the wing, especially the Silver-washed Fritillary, which is sometimes common in woods, but is not always easy to capture, as it is a butterfly of powerful flight.

Towards the end of summer butterflies and moths become less plentiful; but it is then that the Clouded Yellows appear in clover fields, and the beautiful Red Admiral in lanes and orchards; and among the moths the Red Underwing, the Old Lady, and other handsome species. Later in autumn the blossom of the ivy is attractive to numerous moths, many of which belong to the same species as those which visit the sallow bloom in spring

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